Calhoun
Institutional Archive of the Naval Postgraduate School

Calhoun: The NPS Institutional Archive

DSpace Repository

Theses and Dissertations 1. Thesis and Dissertation Collection, all items

1998-09

Computer modeling of captive-carry missile simulator experiments

Goncalves, Wagner A. de Lima

Monterey, California: Naval Postgraduate School

http://hdl.handle.net/10945/39322

Copyright is reserved by the copyright owner.

Downloaded from NPS Archive: Calhoun

DUDLEY KNOX LIBRARY

http://www.nps.edu/library

Calhoun is the Naval Postgraduate School's public access digital repository for research materials and institutional publications created by the NPS community. Calhoun is named for Professor of Mathematics Guy K. Calhoun, NPS's first appointed -- and published -- scholarly author.

Dudley Knox Library / Naval Postgraduate School
411 Dyer Road / 1 University Circle
Monterey, California USA 93943

NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

COMPUTER MODELING OF CAPTIVE-CARRY MISSILE SIMULATOR EXPERIMENTS

by

Wagner A. de Lima Goncalves

September 1998

Thesis Advisor:	Phillip E. Pace
Second Reader:	Robert G. Hutchins

Approved for public release; distribution is unlimited.

DTIC QUALITY INSPECTED 3

19981201 123

REPORT DOCUMENTATION PAGE

Form Approved *OMB No. 0704-0188*

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information suggestions for reducing this burden to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave Blank)	**2. REPORT DATE** September 1998	**3. REPORT TYPE AND DATES COVERED** Master's Thesis

4. TITLE AND SUBTITLE
COMPUTER MODELING OF CAPTIVE-CARRY MISSILE SIMULATOR EXPERIMENTS

5. FUNDING NUMBERS

6. AUTHOR(S)
Goncalves, Wagner A. de Lima

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Naval Postgraduate School
Monterey, CA 93943-5000

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Naval Research Laboratory, Washington, D.C. 20375-5339

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES
The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government

12A. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT *(maximum 200 words)*

The increasing number, diversity and sophistication of anti-ship cruise missiles around the world in the past thirty years have led to sophisticated countermeasures. The Naval Research Laboratory has developed hardware-in-the-loop (HIL) missile simulator technology to assess the effectiveness of electronic attack (EA) countermeasures. These simulators appear in two basic configurations: the closed-loop in an anechoic chamber and the open-loop captive-carry on board a P-3 aircraft.

The objective of this thesis was to develop a comprehensive Simulink© model representing the two HIL missile simulator configurations. These models were then used to study the influence of each parameter on EA effectiveness, as measured by missile miss distance.

The development of this model now makes it possible to compare the seeker responses of the two configurations as well as to have an inexpensive way to test new approaches to combine the closed-loop missile dynamics with the open-loop environment information to obtain more accurate EA effectiveness measurements.

14. SUBJECT TERMS
anti-ship cruise missiles, electronic attack (EA), hardware-in-the-loop, missile, simulations, ASCM Digital Model, EA effectiveness, miss distance

15. NUMBER OF PAGES
313

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT Unclassified	**18. SECURITY CLASSIFICATION OF THIS PAGE** Unclassified	**19. SECURITY CLASSIFICATION OF ABSTRACT** Unclassified	**20. LIMITATION OF ABSTRACT** UL

NSN 7540-01-280-5500

Standard Form 298 (Rev 2-89)
Prescribed by ANSI Std Z39-18
298-102

Approved for public release; distribution is unlimited.

COMPUTER MODELING OF CAPTIVE-CARRY MISSILE SIMULATOR EXPERIMENTS

Wagner A. de Lima Goncalves
Lieutenant, Brazilian Navy
B.S., Escola Naval (Brazilian Naval Academy), 1986

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN SYSTEMS ENGINEERING

from the

NAVAL POSTGRADUATE SCHOOL
September 1998

Author: [redacted]
Wagner A. de Lima Goncalves

Approved by: [redacted]
Phillip E. Pace, Thesis Advisor

[redacted]
Robert G. Hutchins, Second Reader

[redacted]
Dan C. Boger, Chairman
Electronic Warfare Academic Group

ABSTRACT

The increasing number, diversity and sophistication of anti-ship cruise missiles around the world in the past thirty years have led to sophisticated countermeasures. The Naval Research Laboratory has developed hardware-in-the-loop (HIL) missile simulator technology to assess the effectiveness of electronic attack (EA) countermeasures. The simulators appear in two basic configurations: the closed-loop in an anechoic chamber and the open-loop captive-carry on board a P-3 aircraft.

The objective of this thesis was to develop a comprehensive Simulink© model representing the two HIL missile simulator configurations. These models were then used to study the influence of each parameter on EA effectiveness, as measured by missile miss distance.

The development of this model now makes it possible to compare the seeker responses of the two configurations as well as to have an inexpensive way to test new approaches to combine the closed-loop missile dynamics with the open-loop environment information to obtain more accurate EA effectiveness measurements.

TABLE OF CONTENTS

I. INTRODUCTION 1
  A. CAPTIVE-CARRY VERSUS MISSLE EXPERIMENTS BACKGROUND 1
  B. PRINCIPLE CONTRIBUTIONS 2
  C. THESIS ORGANIZATION 3
II. CLOSED-LOOP MISSILE MODEL 5
  A. ASCM/CAPTIVE-CARRY MODEL 5
    1. Tracking Seeker Dynamics 9
      a. *Seeker Dynamics Analysis* 9
      b. *Seeker Description* 24
      c. *Noise Definitions* 24
      d. *Noise Generator* 31
    2. Autopilot 34
      a. *AutoPilot Dynamics Analysis* 34
      b. *AutoPilot Description* 44
    3. Missile/Captive-Carry Dynamics 44
      a. *Missile Dynamics Analysis & Description* 46
      b. *Switch Missile/Captive-Carry* 57
    4. Time_to_Go (TTG) and Miss_Distance 59
III. GENERAL TARGET MODEL 63
  A. TARGET GENERATOR 63
    1. Original Target Generator 70
    2. Ship Generator 70
  B. NULKA GENERATOR 70
    1. Description 72
    2. Nulka.m Code 73
    3. Nulka Enabler 75
  C. SWITCH TARGER/NULKA 76
IV. INITIALIZATION OF THE MODEL PARAMETERS (INITIAL.M CODE) 81

V. OPEN-LOOP CAPTIVE-CARRY MODEL 89
  A. THE CAPTIVE-CARRY EXPERIMENTS 89
  B. CAPTIVE-CARRY MODEL 89
    1. Captive-Carry Dynamics 89
    2. Selections of the Captive-Carry Experiment 95

ASCM DIGITAL CONTROL 97
  A. GUIDELINES FOR BUILDING A GUI 97
  B. GRAPHICAL USER INTERFACES FOR A LARGER NUMBER OF SIMULATIONS 98
  C. GUI CODES 103
    1. *Update.m* Code 104
    2. *Update1.m* Code 105
    3. *Store_simulation.m* Code 105
    4. *Store_simulation1.m* Code 105
    5. *Plot1.m and Plot2.m* Code 105
  D. PROCEDURES TO RUN SIMULATIONS USING *MENU* 106
VII. COMPARISON OF SEEKER SIGNALS 109
VIII. MISS DISTANCE PREDICTION FROM THE CAPTIVE-CARRY SIMULATION 125
  A. INTRODUCTION 125
  B. ASCM DIGITAL MODEL CONFIGURATION FOR THE NEURAL NETWORK 127
  C. TRAINING AND TESTING THE NEURAL NETWORK 127
  D. MISSILE TRAJECTORY PREDICTION USING THE NEURAL NETWORK 129
IX. CONCLUSIONS 153
APPENDIX A. ASCM Digital Model 155
APPENDIX B. *initial.m* Code 179
APPENDIX C. *Noise_Error.m* 197
APPENDIX D. *nulka.m* 201
APPENDIX E. *menu.m* 205
APPENDIX F. *Simulations_plot.m* 217
APPENDIX G. *update.m* 223
APPENDIX H. *update1.m* 227
APPENDIX I. store-simulation 231
APPENDIX J. *store-simulation1* 237
APPENDIX K. *plot1.m* 243
APPENDIX L. *plot2.m* 247
APPENDIX M. Missile Simulations I 251
APPENDIX N. Missile Simualations II 279
APPENDIX O. Neural Network 283
LIST OF REFERENCES 293
INITIAL DISTRIBUTION LIST 295

LIST OF FIGURES

2.1. ASCM Digital Model 6
2.2. Inertial Components in a Missile-Target Engagement 6
2.3. ASCM/Captive-Carry Digital Model 8
2.4. Seeker Dynamics Block 11
2.5. Block Diagram of the Horizontal LOS Rate 12
2.6. Poles-Zero Diagram of the Horizontal Channel 12
2.7. Horizontal Channel Root Locus 13
2.8. Missile Trajectory Effects due to *ska1* Variation 16
2.9. Missile Trajectory Effects due to *ska2* Variation 17
2.10. Missile Trajectory Effects due to *skv1* Variation 18
2.11. Missile Trajectory Effects due to *skv2* Variation 19
2.12. Miss Distance Effects due to *ska1* Parameter Variation 20
2.13. Miss Distance Effects due to *ska2* Parameter Variation 21
2.14. Miss Distance Effects due to *skv1* Parameter Variation 22
2.15. Miss Distance Effects due to *skv2* Parameter Variation 23
2.16. Normalized Offset Angle 28
2.17. Difference Slope versus Sidelobe Level 30
2.18. Noise Generator 32
2.19. AutoPilot Model Block 37
2.20. Block Diagram of the Commanded Horizontal Acceleration 38
2.21. Pole-Zero Diagram of the Commanded Horizontal Acceleration 38
2.22. Horizontal Commanded Acceleration Root Locus 39
2.23. Missile Trajectory Effects due to *ta11* Variation 40
2.24. Missile Trajectory Effects due to *ta2* Variation 41
2.25. Missile Trajectory Effects due to *tb1* Variation 42
2.26. Missile Trajectory Effects due to *tb2* Variation 43
2.27. Missile/Captive-Carry Dynamics Block 45
2.28. Missile Dynamics Block 47
2.29. Velocity Change Sub-Block 49
2.30. Velocity Change Delay Sub-Block 50
2.31. Missile Trajectory Effects due to *tv* Variation 51
2.32. Missile Dynamics X-Y Movement 52
2.33. Missile Trajectory Effects due to *tm* Variation 55
2.34. Missile Trajectory Effects due to *tmv* Variation 56
2.35. Switch Missile/Captive_Carry Dynamics Block 58
2.36. Time_to_Go (TTG) and Miss_Distance Block 62
3.1 General Target Model 64
3.2. Target Generator Sub-Block 65

3.3 Nulka Generator Sub-Block....66
3.4. Switch Target/Nulka Sub-Block....67
3.5. Target Profiles Available in the ASCM Digital Model: (a) Original Target and (b) Ship....69
3.6. Original Target Generator Model....71
3.7. Ship Generator Model....72
3.8. Nulka System Components....74
3.9. Nulka Enabler Model....77
3.10. Switch Target Nulka....79
5.1. NRL P-3 Captive-Carry Research Aircraft Carrying the HIL Simulators....90
5.2. Captive-Carry Dynamics Block....92
5.3. Captive-Carry Trajectory....93
5.4. Captive-Carry Position Generator Block....94
5.5. Example of Captive-Carry and Target Trajectories....95
6.1. GUI Menu....99
6.2. GUI Simulations_plot....101
7.1. Seeker Response Comparison for *ska1* and *ska2*....111
7.2. Seeker Response Comparison for *ska1* and *ska2*....112
7.3. Seeker Response Comparison for *skv1* and *skv2*....113
7.4. Seeker Response Comparison for *skv1* and *skv2*....114
7.5. Seeker Response Comparison for *enra* and *enrb*....115
7.6. Seeker Response Comparison for *enra* and *enrb*....116
7.7. Seeker Response Comparison for *ta1* and *ta2*....117
7.8. Seeker Response Comparison for *ta1* and *ta2*....118
7.9. Seeker Response Comparison for *rb1* and *tb2*....119
7.10. Seeker Response Comparison for *tb1* and *tb2*....120
7.11. Seeker Response Comparison for *tm* and *tmv*....121
7.12. Seeker Response Comparison for *tm* and *tmv*....122
7.13. Seeker Response Comparison for *tv*....123
7.14. Seeker Response Comparison for *tv*....124
8.1. Neural Network Basic Training Process....126
8.2. Neural Network Configuration for Missile Dynamics Prediction....128
8.3. Log Sigmoid Transfer Function....130
8.4. Linear Transfer Function....130
8.5 Seeker Inputs for the Neural Network (Simulation 5)....134
8.6 Missile Trajectory Comparison – Actual x NN Prediction-Simulation 5...135
8.7 Seeker Inputs for the Neural Network (Simulation 15)....136
8.8 Missile Trajectory Comparison – Actual x NN Prediction-Simulation 15.137
8.9 Seeker Inputs for the Neural Network (Simulation 25)....138
8.10 Missile Trajectory Comparison – Actual x NN Prediction-Simulation 25.139
8.11 Seeker Inputs for the Neural Network (Simulation 35)....140
8.12 Missile Trajectory Comparison – Actual x NN Prediction-Simulation 35.141

8.13 Seeker Inputs for the Neural Network (Simulation 45) 142
8.14 Missile Trajectory Comparison – Actual x NN Prediction-Simulation 45 . 143
8.15 Seeker Inputs for the Neural Network (Simulation 55) 144
8.16 Missile Trajectory Comparison – Actual x NN Prediction-Simulation 55 . 145
8.17 Seeker Inputs for the Neural Network (Simulation 65) 146
8.18 Missile Trajectory Comparison – Actual x NN Prediction-Simulation 65 . 147
8.19 Seeker Inputs for the Neural Network (Simulation 75) 148
8.20 Missile Trajectory Comparison – Actual x NN Prediction-Simulation 75 . 149
8.21 Seeker Inputs for the Neural Network (Simulation 8) 150
8.22 Missile/Captive-Carry Prediction Comparison – Simulation 8 151

LIST OF TABLES

2.1 Estimated Seeker Parameters 27
4.1. ASCM Digital Model Default Parameters 82
4.2. ASCM Digital Model Initial Values Range 86
8.1. Miss Distance Comparison between the Actual Threat and the NN Prediction 132
8.2. Miss Distance Comparison between the Actual Threat and the NN NN Prediction 133

ACKNOWLEDGEMENT

It is with a sincere heart and deep gratitude that I thank Professor Phillip E. Pace for being my thesis advisor. I am thankful for his wise counsel and insight as well as his patience in reviewing several model prototypes and thesis drafts.

Also, I would like to thank Colin Cooper for his help in the design of the graphical user interfaces, Professor Monique Fargues for her assistance with the Neural Network, Professor Robert G. Hutchins for his stimulating suggestions regarding this thesis, and Nancy Sharrock for her patience during the thesis review process.

Nevertheless, helpful discussions with friends such as Maj (BAF) Silvino, LCDR (BN) Cardoso, Maj (BAF) Pontes, CPT (BAF) Breno, LT Marcia Sonon, LTJG (PN) Abrantes, and Ensign (BAF) Taranti also contributed to the enrichment of the subjects covered in this thesis.

Finally, but really most importantly, I thank my lovely wife, Marcia, my daughter, Isabela, and little Gabriel for their support during this challenging phase in my naval career.

I. INTRODUCTION

A. CAPTIVE-CARRY VERSUS MISSILE EXPERIMENTS BACKGROUND[1]

Active threat missile systems are one of the warfighter's most serious concerns. Electronic attack (EA) systems play an important role in countering this type of threat. The use of EA, if effective, can alter the flight path of the missile, causing it to miss the target completely. Using hardware-in-the-loop (HIL) missile simulator technology, a cost-effective tool is maintained for testing and evaluating the EA effectiveness in a variety of real-time engagements. The two major HIL simulator test configurations are 1) closed-loop in an anechoic chamber, and 2) open-loop captive-carry on board of an aircraft.

In the closed-loop anechoic chamber configuration, the HIL simulator is mounted on a computer controlled, three axis flight table that simulates the missile flight dynamics by providing roll, pitch and yaw motion. Computer controlled sources located on the anechoic chamber wall (opposite the seeker) simulate a variety of targets, EA and background clutter (synthetic environment). In a real-time simulation, the missile flies toward the target using the guidance signals from the seeker. Since the simulation must finish in a required time frame, the time step is usually chosen as large as possible while maintaining a stable and accurate simulation. The closed-loop configuration in the anechoic chamber is extremely useful for determining the EA effectiveness as a predicted miss distance (MD).

---

[1] Based on the class notes/homework assignments of EC3700, Fall Quarter 1997 by P. E. Pace.

In the open-loop captive-carry configuration, the simulators are installed on a specially configured aircraft that flies an inbound pattern toward the target/EA system. The captive-carry configuration has the advantage of providing the response of the seeker to an actual terminal phase environment where the natural interference(e.g., background clutter), test geometry, and target scintillation may cause less than predictable behavior. Since the captive-carry simulator does not maneuver, the randome-induced seeker pointing error are different than those experienced by a real missile seeker due to the differences in incident angles of the received signals. Also, multi-path fades will occur at different rates and times due to the large difference in platform velocities.

The captive-carry results contain the seeker angles and the seeker measured range-to-target but contains no missile-dynamics. Consequently, the seeker response does not directly imply an EA effectiveness. For example, important EA techniques such as chaff used in a seduction mode involve time play out issues over several minutes (deployment, bloom, deception). To calculate a predicted MD, the captive-carry seeker response must be modified in combination with a model of the missile dynamics to account for any missile movement that might have occurred over the engagement time- a complicated process. Other high bandwidth EA techniques, however, cause a violent seeker response within a short period of time (e.g., range gate pull-off to cross polarization). For these cases the seeker response may be used directly to calculate a MD.

B. PRINCIPAL CONTRIBUTIONS

The first relevant achievement of this thesis is to provide a Simulink© model capable of comparing the closed-loop and open-loop simulations in a compact digital model. The description of the missile processing (how the missile guides itself to the target) and the mathematical models that are used to evaluate the missile's performance are provided as well as the description of the captive-carry platform and target models.

As a second achievement of this is the design of a MATLAB Graphical User Interface (GUI) to create a friendly and non-time consuming interface between the user and the model parameters in order to run a massive number of simulations. These simulations are required for a comprehensive model analysis, for comparing seeker responses and neural network training, testing and evaluation.

C. THESIS ORGANIZATION

In Chapter II, the part of the ASCM Digital model related with the missile (closed-loop) simulation is described in detail as is the effect of each model parameter on the missile trajectory and miss distance. When necessary, each parameter associated with a missile component is modeled using a block diagram. From that block diagram, the system transfer function is obtained and, from its root locus the theoretical missile performance is predicted.

Chapter III describes the two types of targets that can be simulated with the ASCM Digital Model including the generation of a Nulka decoy. Chapter IV discusses the MATLAB© parameter initialization code *intial.m* Chapter V describes the major differences between the closed-loop and open-loop configurations. Chapter VI describes the Graphical User Interface (GUI) *Menu* and *simulations_plot*. The GUI *Menu* executes several functions such as running the pre-set missile and captive-carry simulations, storing the model results for post-simulation analysis and calling the other GUI, *simulations_plot*, for graphing the players (missile, captive-carry and target) of each engagement as well as the seeker performance results (position, rates and accelerations) in each scenario. Chapter VII creates a tactical scenario to run simulations required to compare the seeker responses of the two configurations. In Chapter VIII, a neural network (NN) is created, trained with the closed-loop configuration data and, after that, a missile prediction trajectory is made using the open-loop captive-carry data. Finally, Chapter IX discusses the results obtained in this thesis.

II. CLOSED-LOOP MISSILE MODEL

A. ASCM/CAPTIVE-CARRY MODEL

The purpose of this chapter is to describe the ASCM Digital model (Appendix A) using Simulink© 2.1, a MATLAB© toolbox. This model was created to simulate a closed-loop engagement by a sea-skimming missile and, depending on the model configurations in the *initial.m* code (Appendix B), also simulates the corresponding open-loop captive-carry experiment. This section will discuss the closed-loop engagement.

The upper level block diagram of the ASCM Digital model is shown in Figure 2.1. It models the tactical engagement represented in Figure 2.2. The inertial components are generated to run the simulation by repositioning the missile in relation to the target position. The inertial parameters are the position differences in the X, Y and Z directions (R_{TM-X}, R_{TM-Y}, R_{TM-Z}, respectively), the magnitude of the distance vector between the target and the missile (R_{TM}), and the horizontal line of sight (L.O.S.) in azimuth (ϕ) and the vertical L.O.S. in elevation (θ).

The formulas below represent the inertial values for the ASCM Digital model:

$$R_{TM-X} = R_{TX} - R_{MX} = \Delta X \quad \textbf{(1)}$$

$$R_{TM-Y} = R_{TY} - R_{MY} = \Delta Y \quad \textbf{(2)}$$

$$R_{TM-Z} = R_{TZ} - R_{MZ} = \Delta Z \quad \textbf{(3)}$$

$$R_{TM-XY} = \sqrt{R_{TM-X}^{2} + R_{TM-Y}^{2}} \quad \textbf{(4)}$$

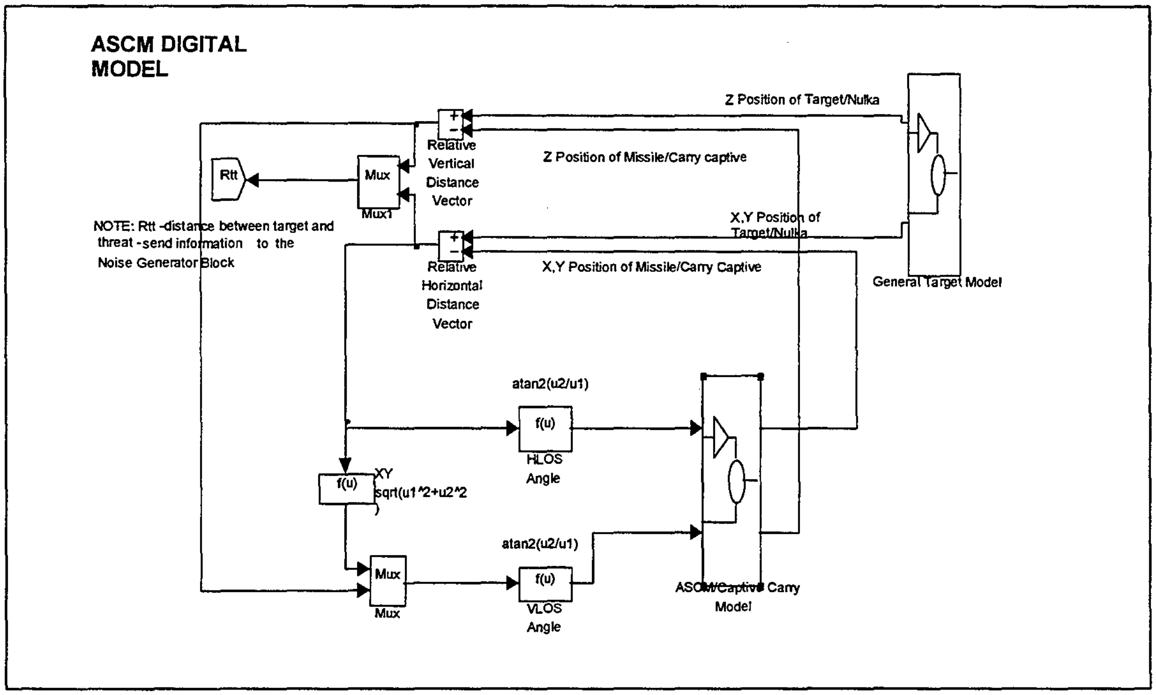

ASCM DIGITAL MODEL
Z Position of Target/Nulka
Rtt
Mux
Mux1
+
-
Relative Vertical Distance Vector
Z Position of Missile/Carry captive
NOTE: Rtt -distance between target and threat -send information to the Noise Generator Block
X,Y Position of Target/Nulka
Relative Horizontal Distance Vector
X,Y Position of Missile/Carry Captive
General Target Model
atan2(u2/u1)
f(u)
HLOS Angle
XY
sqrt(u1^2+u2^2)
atan2(u2/u1)
Mux
f(u)
VLOS Angle
ASCM/Captive Carry Model

Figure 2.1. ASCM Digital Model

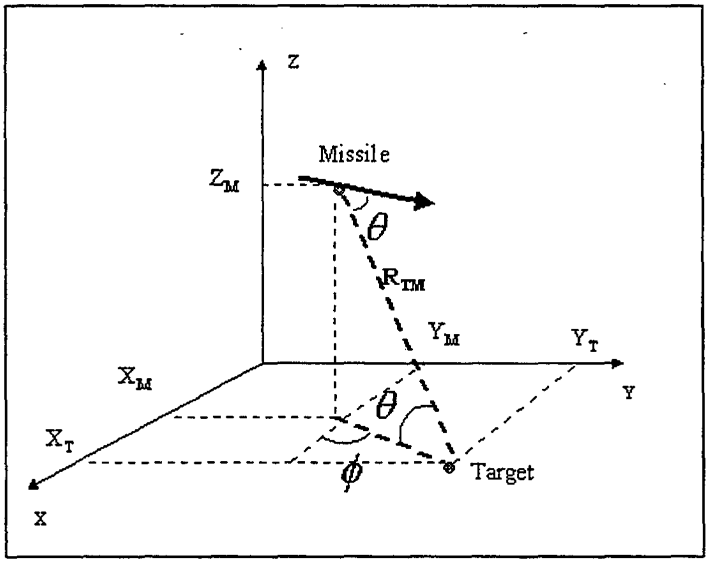


Figure 2.2. Inertial Components in a Missile-Target Engagement

$$\phi = \tan^{-1}(\Delta Y / \Delta X) \quad \textbf{(5)}$$

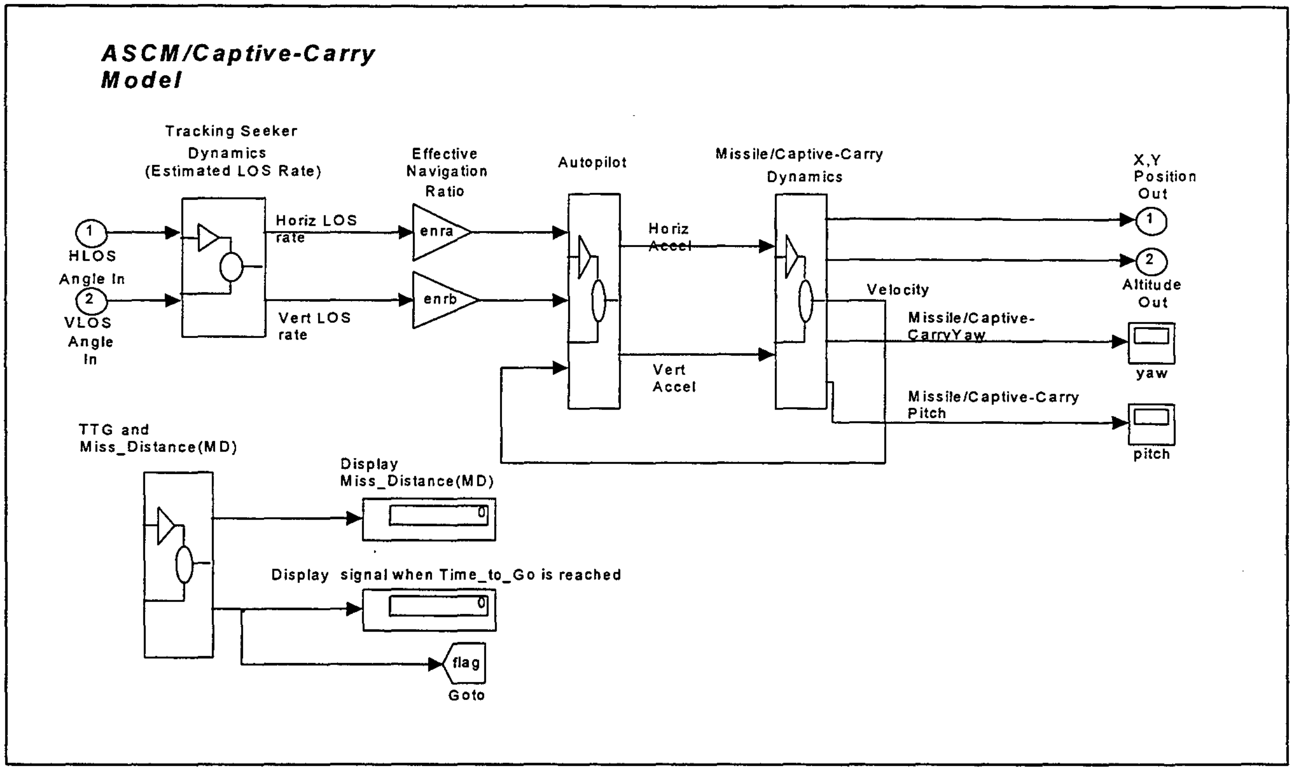
$$\theta = \tan^{1}(\Delta Z / R_{TM\text{-}XY}) \quad \textbf{(6)}$$

The ASCM digital model receives the missile position from the block ASCM/Captive-Carry model and the target position from the General Target model. The position differences are separated into two channels. One for the X-Y direction (Eqs.1 and 2) and the other for the Z direction (Eq. 3). After the calculation of ΔX, ΔY and ΔZ by the Simulink© summation blocks, these values are combined accordingly in Eqs. 4, 5 and 6 and the final results are the horizontal L.O.S. (ϕ) in and the vertical L.O.S. (θ). These are the inputs of the ASCM/Captive-Carry model.

In the ASCM/Captive-Carry model, estimates of ϕ and θ are introduced in the Seeker Dynamics block (Figure 2.3), where the seeker dish horizontal and vertical L.O.S. rates ($\dot{\phi}$and $\dot{\theta}$) are obtained. Seeker noise is also added in this block. The $\dot{\phi}$ and $\dot{\theta}$ are multiplied by a unitless designer chosen gain known as effective navigation rate in the horizontal (***enra***) and vertical channel (***enrb***).

According to [Ref.1], "the proportional navigation guidance law issues acceleration commands, n_c , perpendicular to the instantaneous missile-target L.O.S., which is proportional to the L.O.S. rate and the closing velocity or

$$n_c = N' V_C \dot{\lambda} \quad \textbf{(7)}$$


ASCM/Captive-Carry Model
Tracking Seeker Dynamics (Estimated LOS Rate)
Effective Navigation Ratio
Autopilot
Missile/Captive-Carry Dynamics
X,Y Position Out
1
HLOS Angle In
2
VLOS Angle In
Horiz LOS rate
Vert LOS rate
enra
enrb
Horiz Accel
Vert Accel
Velocity
1
2
Altitude Out
Missile/Captive-CarryYaw
yaw
Missile/Captive-Carry Pitch
pitch
TTG and Miss_Distance(MD)
Display Miss_Distance(MD)
0
Display signal when Time_to_Go is reached
0
flag
Goto

SUMMARY:

BLOCK: ASCM / Captive Carry

SUB-BLOCK(s): Tracking Seeker Dynamics
AutoPilot
Missile / Captive-Carry Dynamics
TTG and Miss_Distance

INPUT(s): H.L.O.S. (Horizontal Line of Sight) - ϕ
V.L.O.S. (Vertical Line of Sight) - θ

OUTPUT(s): Missile X, Y and Z position
Pitch
Yaw

AVAILABLE FUNCTION(s): None.

Figure 2.3. ASCM/Captive-Carry Digital Model

where n_C is the acceleration command (in ft/sec^2), N' is the effective navigation ratio, V_C is the relative closing velocity (ft/sec) between the missile and the target and $\dot{\lambda}$ is the instantaneous L.O.S.. The multiplication $\dot{\phi}$ and $\dot{\theta}$ by ***enra*** and ***enrb*** now is understood as a preparation of the L.O.S. rates as inputs to the AutoPilot block (Figure 2.3). In the AutoPilot, the products $\dot{\phi}$ ***enra*** and $\dot{\theta}$ ***enrb*** are filtered and multiplied by V_C and sent to the Missile/Captive-Carry Dynamics block where they are used to generate the resulting missile position, velocity magnitude, yaw and pitch. The simulation stops when the missile hits the target or crosses over the target seduced by the Nulka rocket electronic attack (EA).

1. Tracking Seeker Dynamics

a. Seeker Dynamic Analysis

The Seeker Dynamics block is shown in Figure 2.4. Before beginning to describe how the L.O.S. rates are calculated in the seeker, a theoretical analysis of the influence of its parameters in the missile trajectory as well as comparing the theoretical results with the results obtained from the model simulations are described. This study was made over the horizontal channel but it is also valid for the vertical channel.

The first step in the analysis was to convert the horizontal channel in Figure 4 into the block diagram on Figure 2.5. From the block diagram

$$e = \lambda_i - \lambda_o \qquad \textbf{(8)}$$

$$\dot{\lambda} = \frac{e(ska1) - \lambda(ska2)}{s} \qquad \textbf{(9)}$$

$$\lambda_0 = \frac{\dot{\lambda}}{s} \qquad \textbf{(10)}$$

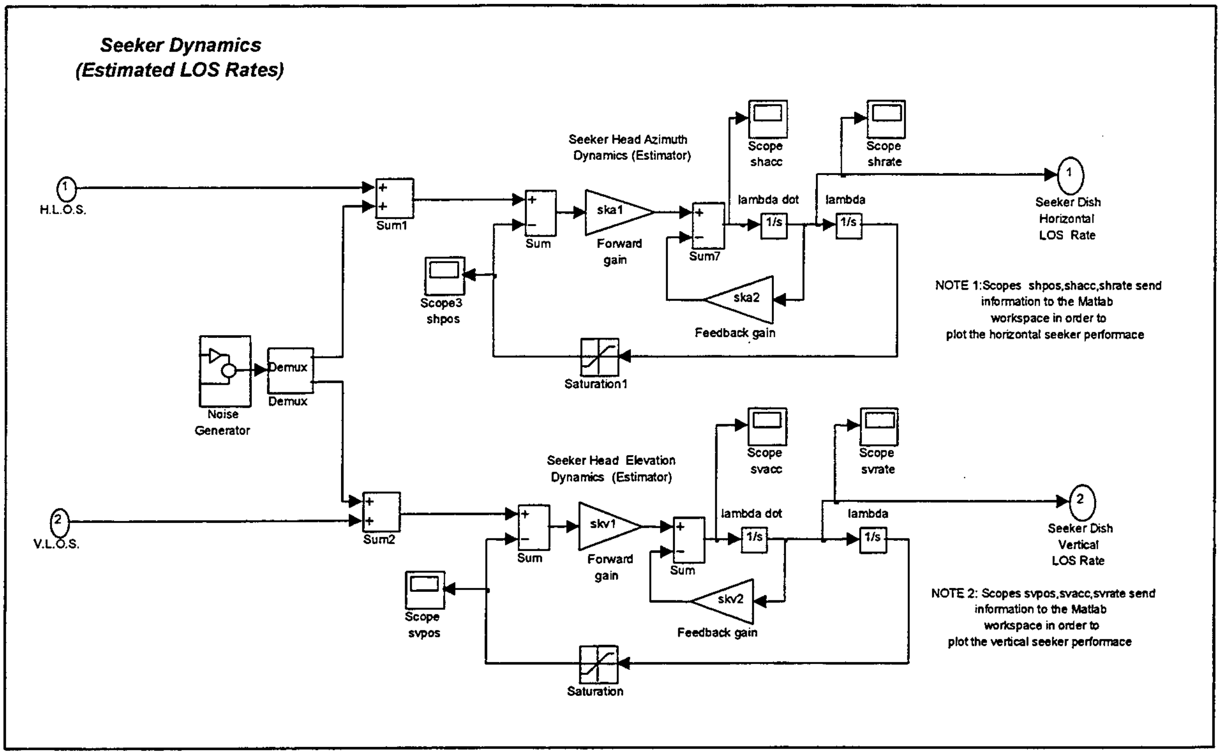
where ***ska1*** is the seeker forward gain in the Seeker Head Azimuth Dynamics and ***ska2*** is the seeker feedback gain. After some algebraic manipulations, the channel transfer function is:

$$\dot{\lambda} = \left(\frac{(ska1)s}{\left(s^2 + (ska2)s + ska1\right)}\right)\lambda_i \qquad \textbf{(11)}$$

and a second order transfer function with one zero, two poles and gain equal to ***ska1*** is realized. Making the pole-zero diagram shown in Figure 2.6 and using the default values of ***ska1***=***ska2***=0.25 a stable system with all poles in the left-hand side of the plane is shown. This generates an oscillation in time due to the imaginary component of the poles (an underdamped system).

To understand the effects of varying the values of the ***ska1*** necessary to obtain the system open-loop (without feedback) transfer function from Figure 2.5. After some manipulations,

$$\frac{\lambda_o}{\lambda_i - \lambda_o} = \frac{ska\ 1}{s(s + ska\ 2)} \qquad \textbf{(12)}$$



NOTE 1:Scopes shpos,shacc,shrate send information to the Matlab workspace in order to plot the horizontal seeker performace

NOTE 2: Scopes svpos,svacc,svrate send information to the Matlab workspace in order to plot the vertical seeker performace

SUMMARY:

BLOCK: Seeker Dynamics (Estimated LOS Rates)

SUB-BLOCK (s): None.

INPUT(s): H.L.O.S. (Horizontal Line of Sight) - ϕ
V.L.O.S. (Vertical Line of Sight) - θ

OUTPUT(s): Seeker Dish Horizontal LOS rate - $\dot{\phi}$
Seeker Dish Vertical LOS rate - $\dot{\theta}$

AVAILABLE FUNCTION(s): None.

Figure 2.4. Seeker Dynamics Block

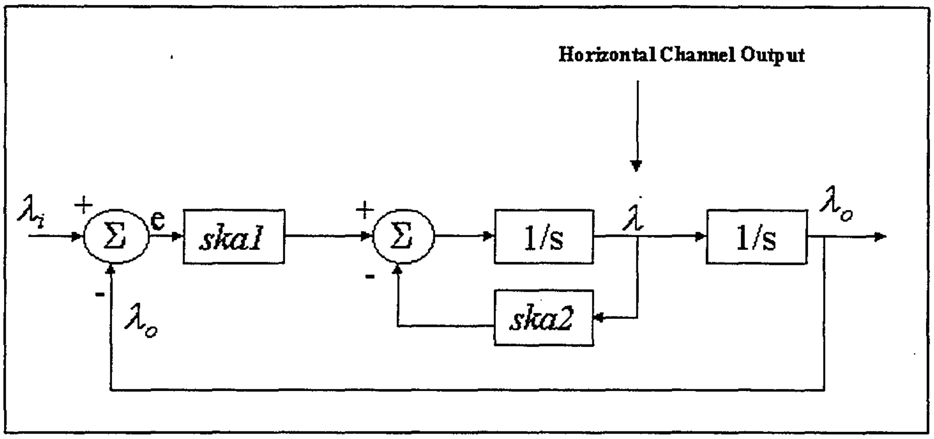


Figure 2.5. Block Diagram of the Horizontal LOS Rate

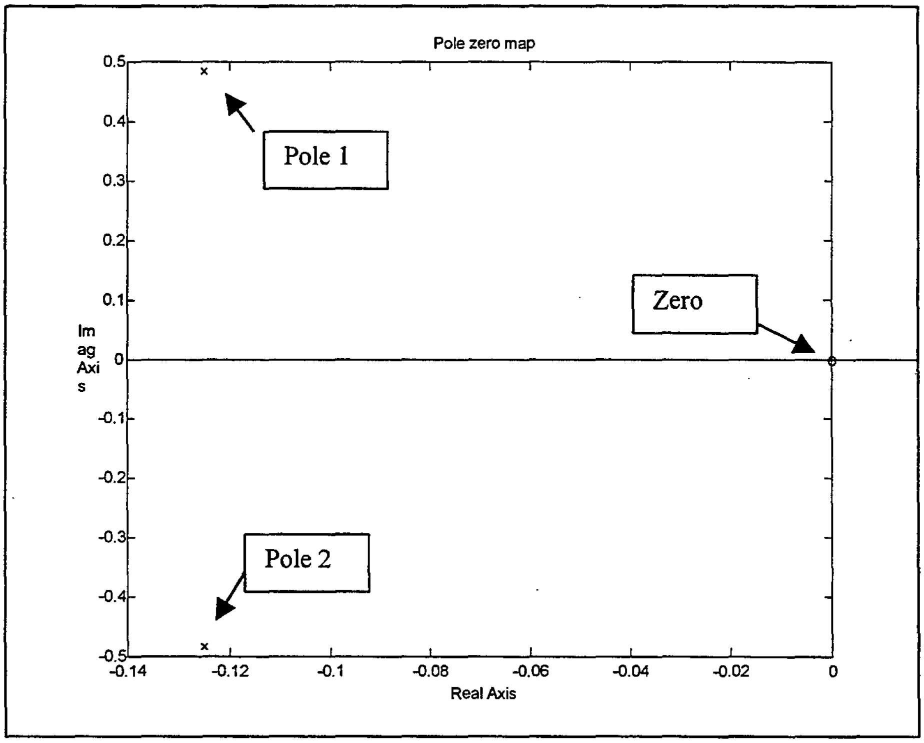


Figure 2.6. Pole-zero Diagram of the Horizontal Channel

where the two poles are located at zero and – ***ska2*** and the gain of the system is ***ska1***. The root locus plot is shown in Figure 2.7 for the horizontal channel with ***ska1***=***ska2***=0.25.

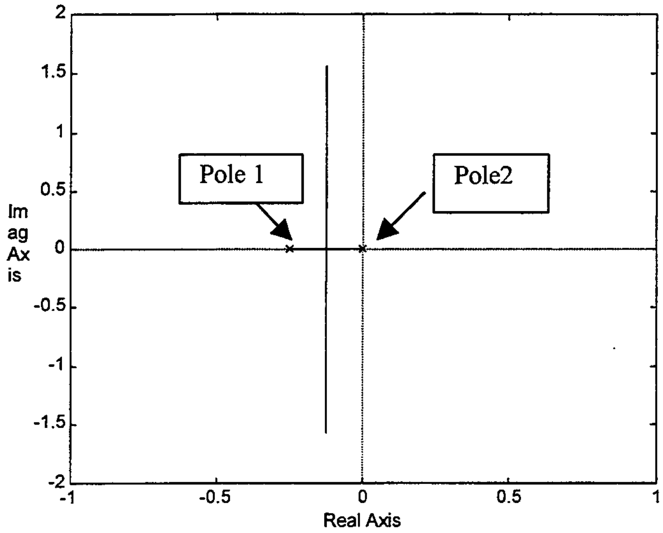


Figure 2.7. Horizontal Channel Root Locus

Analyzing the root locus shown in Figure 2.7, the system output, i.e., the seeker horizontal L.O.S. rate, has a larger natural oscillating frequency (ringing) when the value of ***ska1*** is increased. Also, the more the value of ***ska1*** is increased the less the system is damped. On the other hand, when the value of ***ska1*** is decreased, the seeker L.O.S. rate has few or no oscillations in the stabilization period and the system becomes overdamped.

When the value of ***ska2*** is increased, one of the system poles becomes further from the vertical axis and, therefore, depending of the value of ***ska1***, the system damping is increased. When the ***ska2*** is decreased, the system poles are closer to the vertical axis and the system becomes less damped. That is, more time is needed for the antenna to stabilize in a position that reduces the error to zero.

From the explanation about the values of ***ska1*** and ***ska2***, it can be concluded that the variation of ***ska1*** affects the oscillation frequency that occurs and ***ska2*** affects the damping during that stabilization period. These results can be extended to the ***skv1*** (seeker forward gain) and ***skv2*** (seeker feedback gain) parameters for the seeker vertical L.O.S..

The next step is to compare our theoretical results from the root locus study with results obtained from the simulation generated by the ASCM Digital model. In Figure 2.8, the missile trajectory has more oscillations when ***ska1***=4 than when ***ska1***=0.1, thus confirming our expectations about the performance of the Seeker Head Azimuth Dynamics block in Figure 2.4. In Figure 2.9, it is proven that the larger the ***ska2*** value is, the less the system response is damped. Thus, the seeker will take longer to stabilize at the correct L.O.S.. All these runs were made using the default values for all the parameters (see Table 4.1), except for the values of ***ska1*** and ***ska2***. These runs also used a COSRO seeker (with seeker noise) with Gaussian shaped antenna beam (see sub-sub-section 1.c). These can be extended for the vertical channel by only changing the name of variables, ***skv1*** (for forward gain) and ***skv2*** (for feedback gain). The missile's performance can be observed in Figures 2.10 and 2.11.

Our last step is to observe how the changing seeker parameters affect the miss distance. The miss distance (MD) is the point of closest approach between missile and target. Figure 2.12 shows the MD for the ***ska1*** variation as a function of the time-to-go (time before the missile hits the target). In the model, time-to-go (***ttg***) is also a variable and, when it is reached, a Nulka decoy, (electronic attack (EA) against sea-skimming missiles) is launched. Note from Figure 2.12 that until ***ttg*** is equal to 12 seconds, the miss distance is higher for the ***ska1*** values 0.1 and 4. The missile system with the overdamped seeker, ***ska1*** = 0.1, responds faster than the underdamped seeker ***ska1***=4 when the Nulka is launched. The miss distance is bigger for the overdamped seeker because it more rapidly generates the required rates to reposition the missile towards the Nulka position while the underdamped seeker is still oscillating to reposition the missile to the previous Nulka position. After 12 seconds, the default value ***ska1***=0.25 gets a larger miss distance value than the other ***ska1*** values because it allows the missile to have more maneuvering time to reposition the missile while the target is escaping before the simulation ends. In Figure 2.13, the MD effects of varying ***ska2*** are presented. In Figures 2.14 and 2.15, the MD effects of varying ***sku1*** and ***sku2*** (vertical channel) are observed.

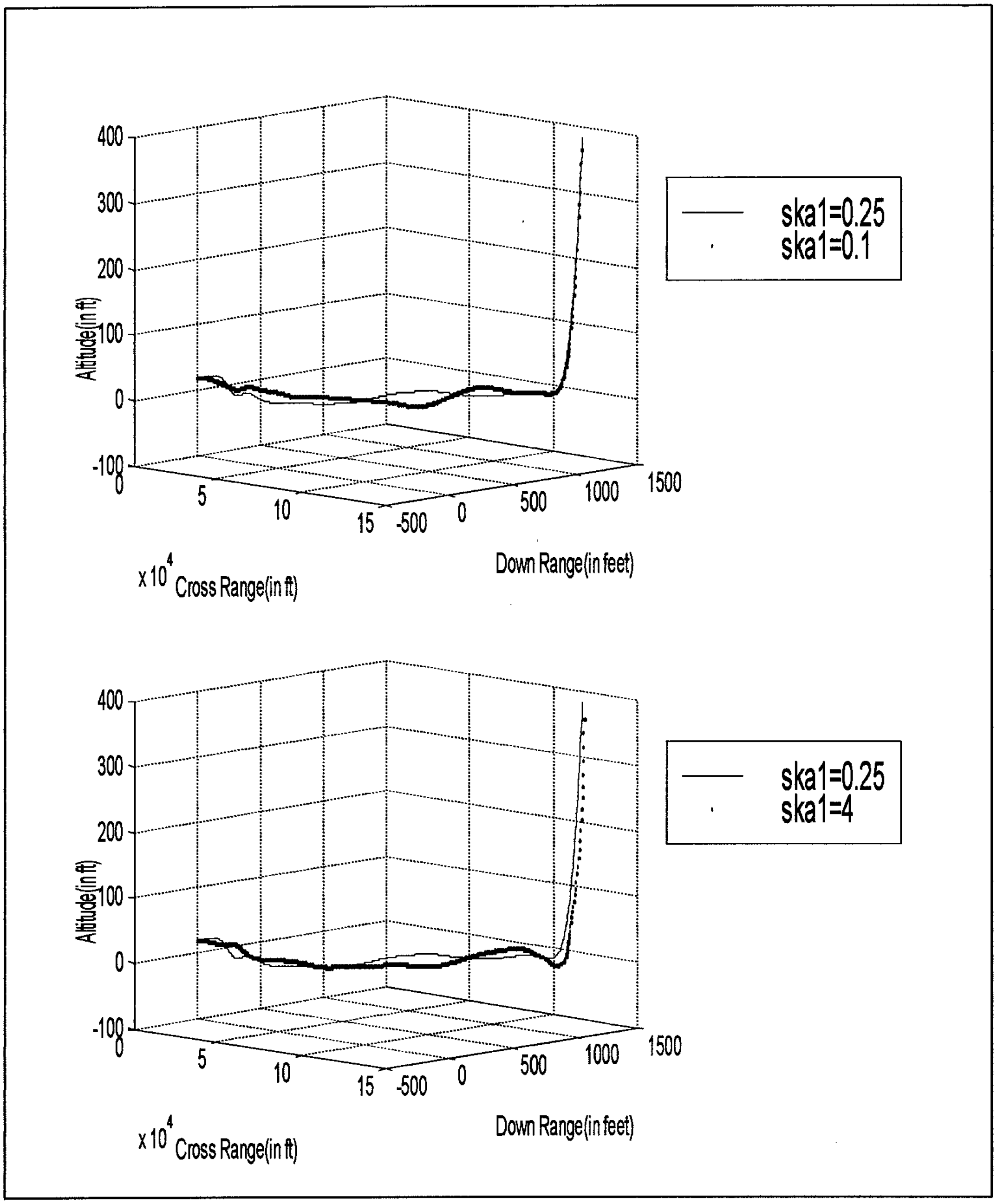


Figure 2.8. Missile Trajectory Effects due to the *ska1* Variation

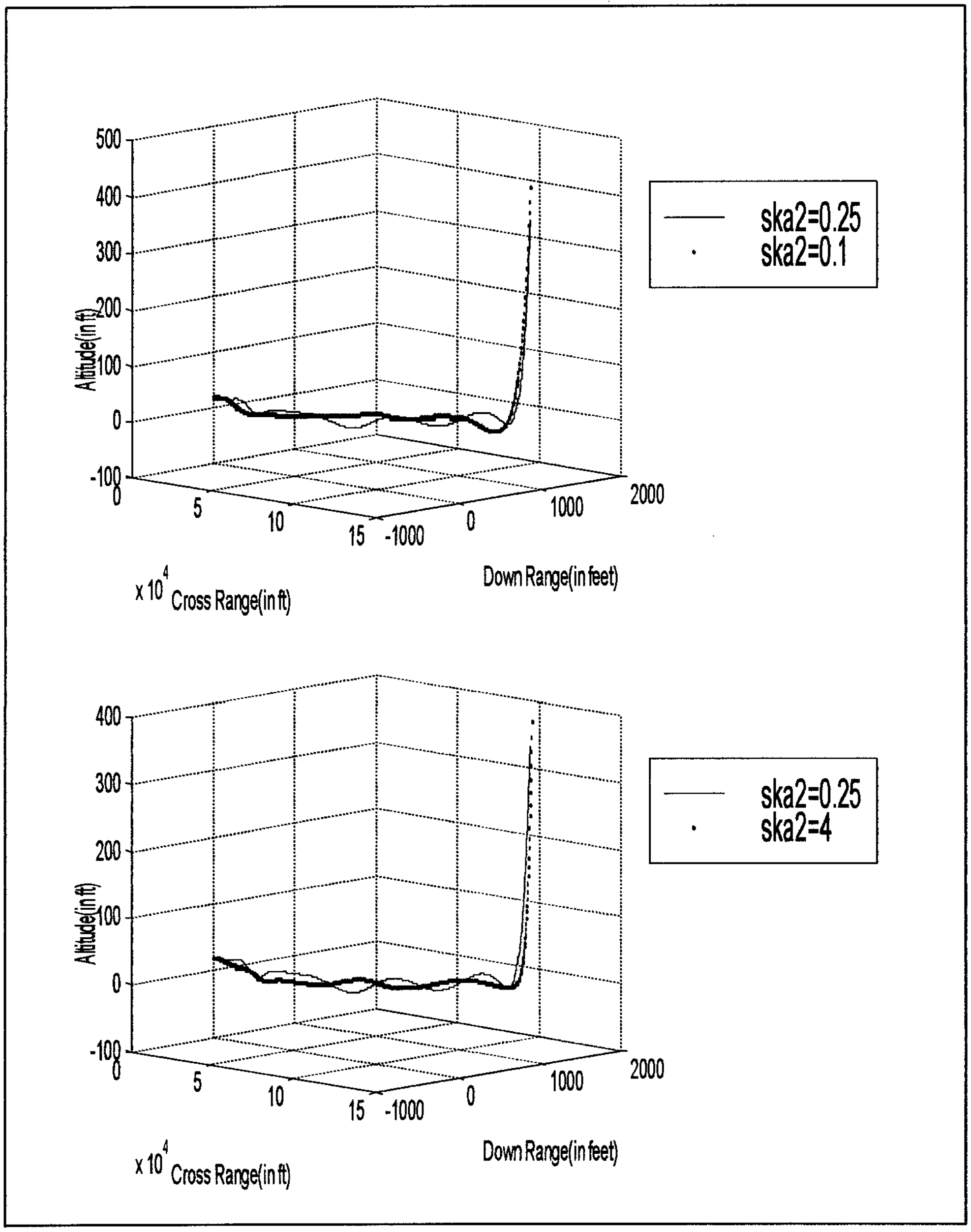


Figure 2.9. Missile Trajectory Effects due to the *ska2* Variation

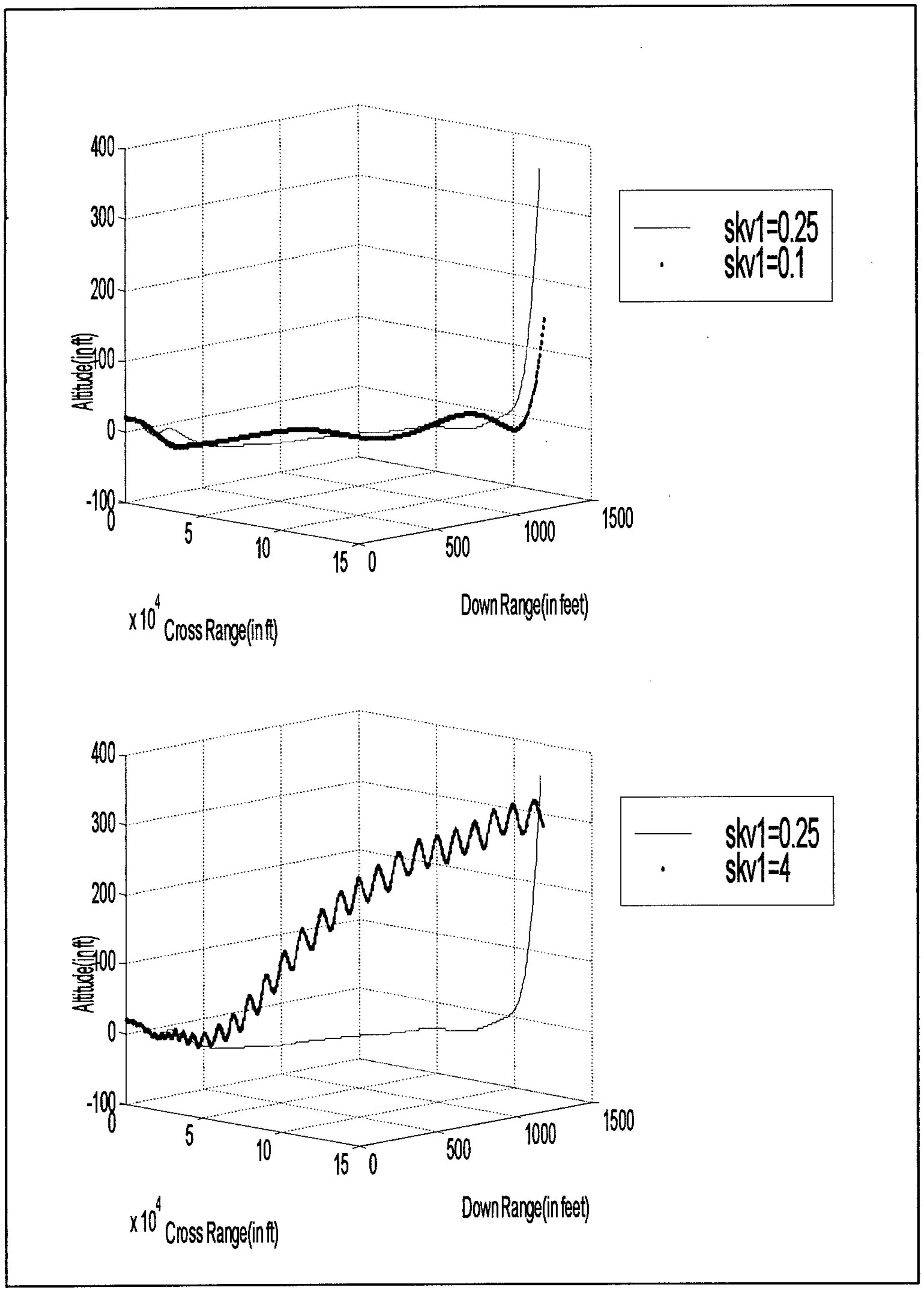


Figure 2.10. Missile Trajectory Effects due to the *skv1* Variation

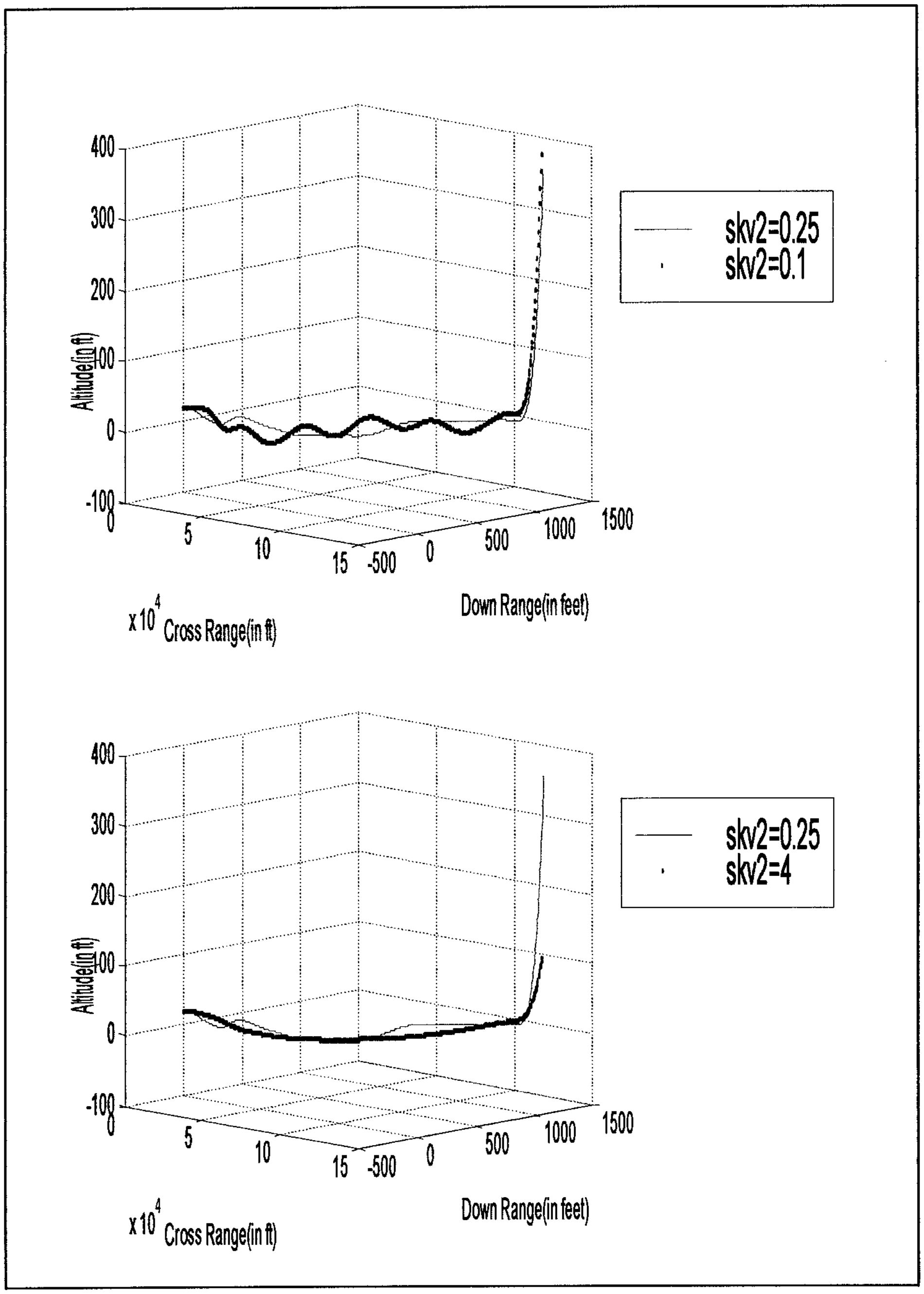


Figure 2.11. Missile Trajectory Effects due to the *skv2* Variation

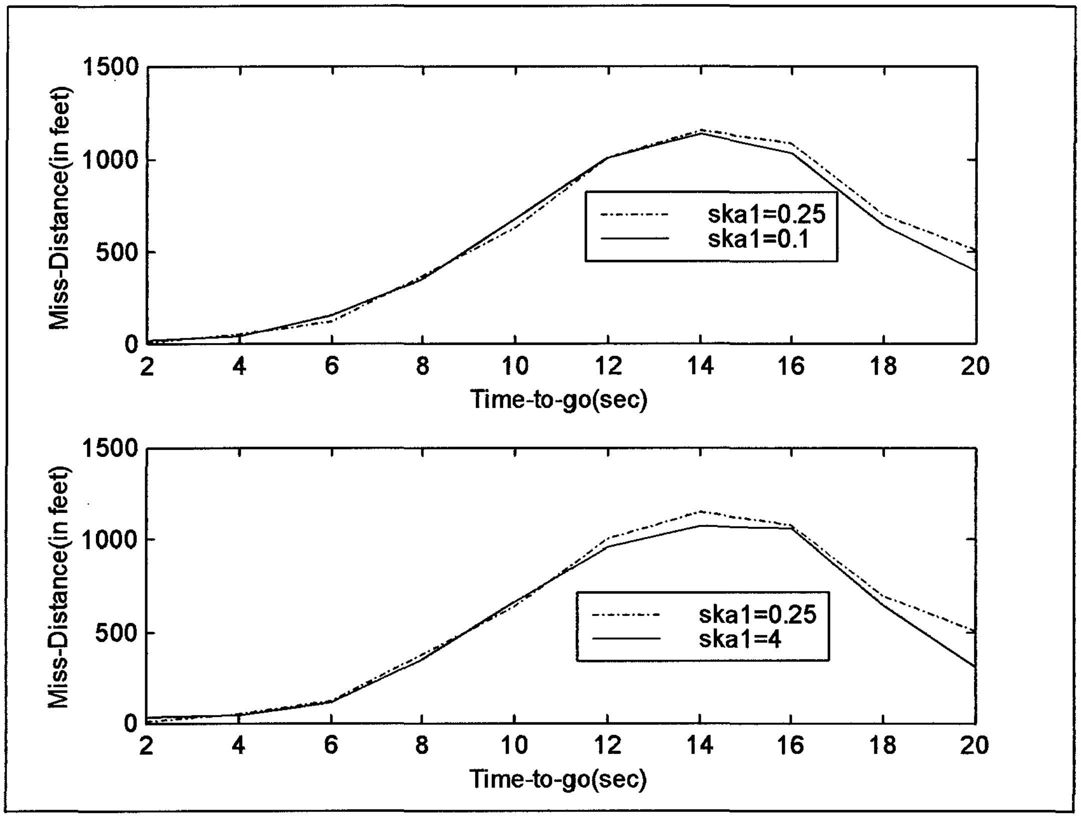


Figure 2.12. Miss Distance Effects Due to *ska1* Parameter Variation

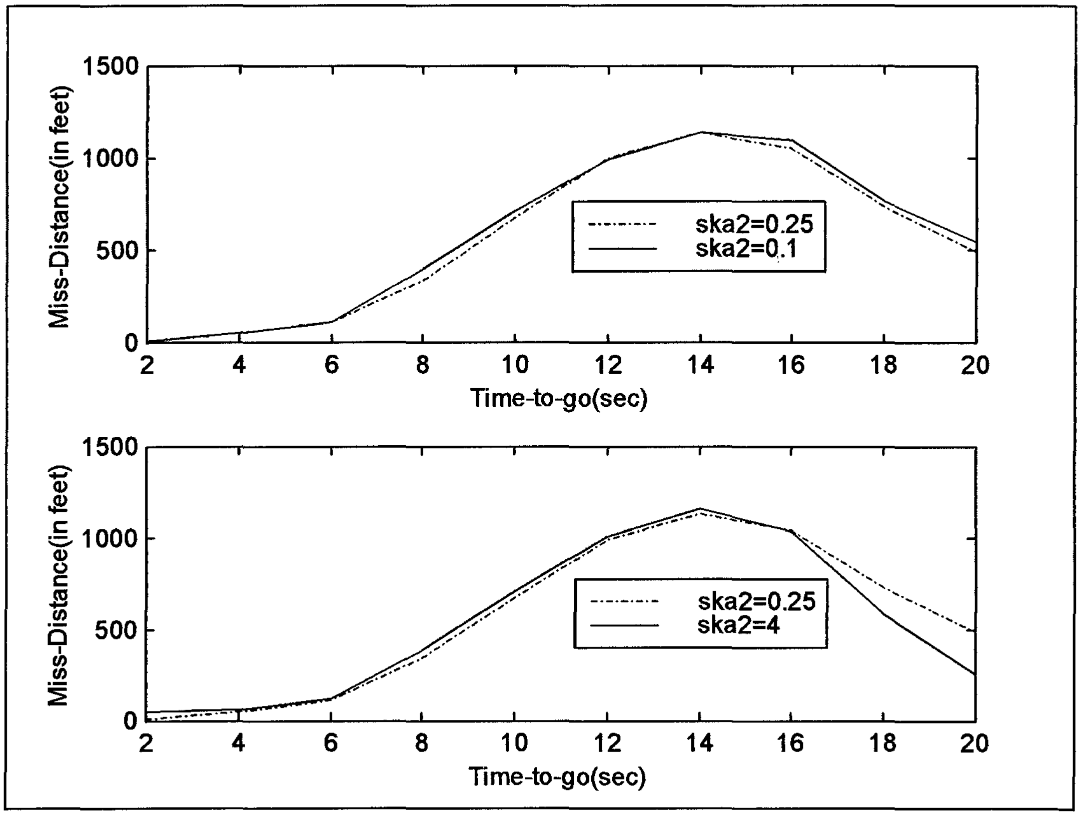


Figure 2.13. Miss Distance Effects due to *ska2* Parameter Variation

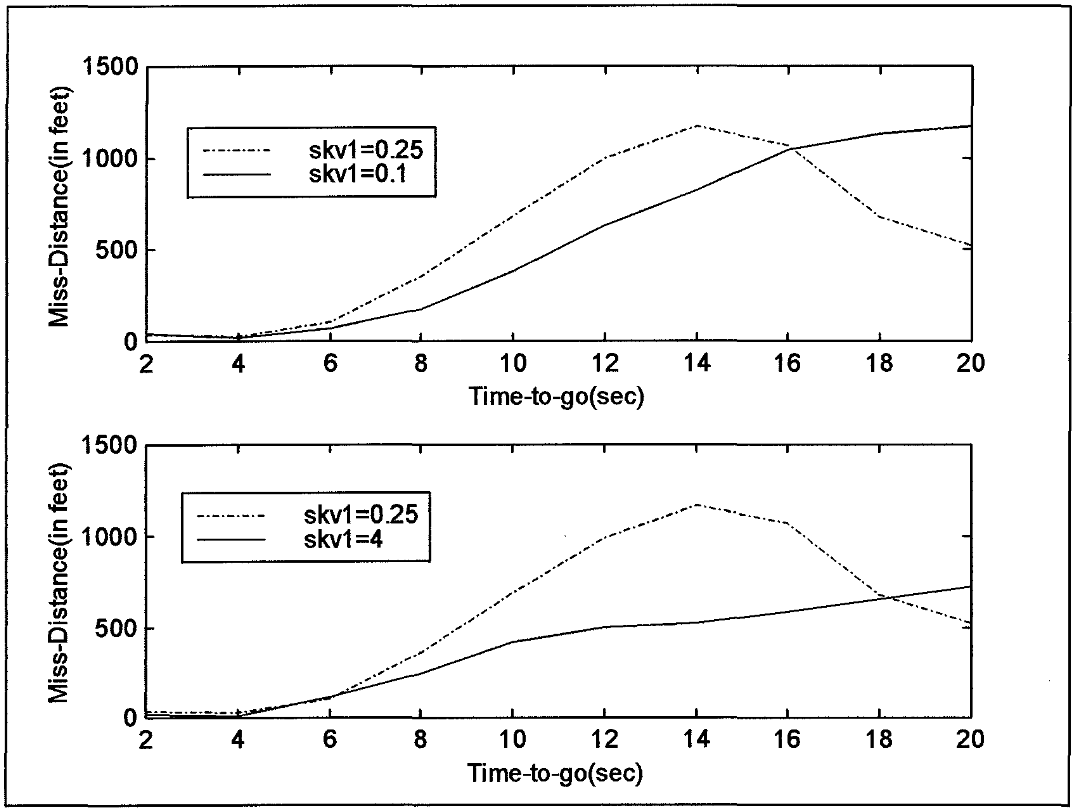


Figure 2.14. Miss Distance Effects due to *skv1* Parameter Variation

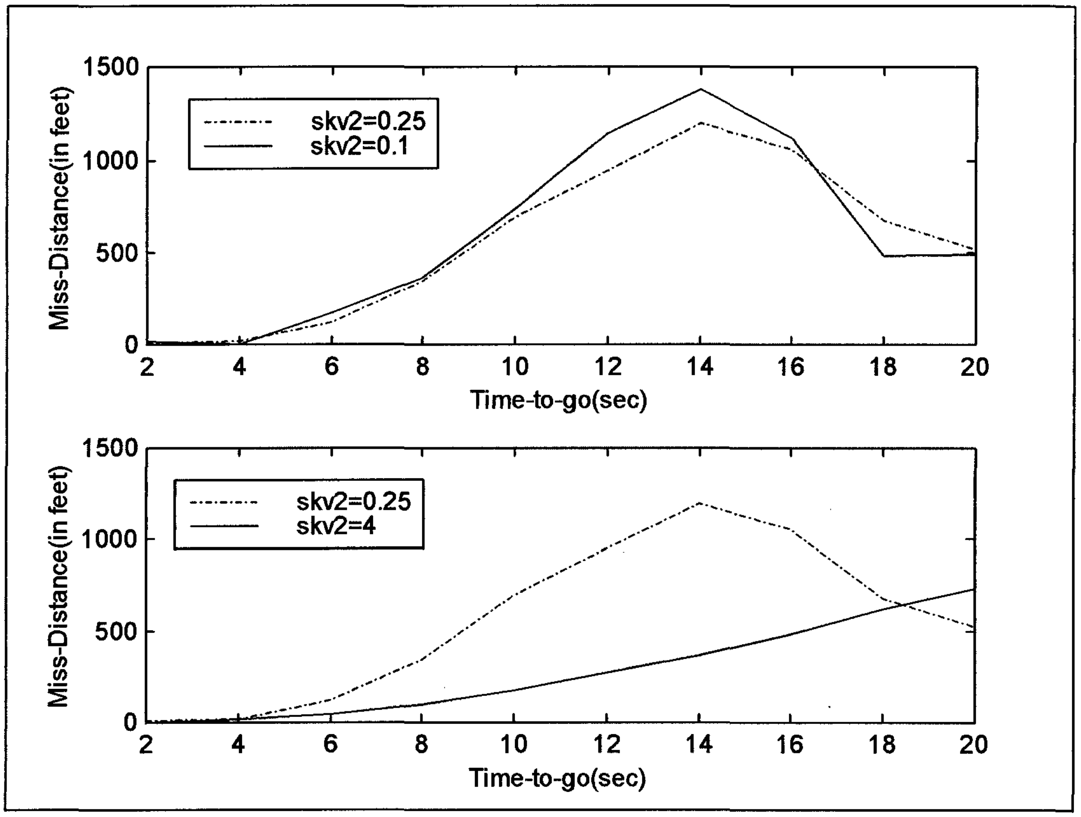


Figure 2.15. Miss Distance Effects due to *skv2* Parameter Variation

b. Seeker Description

The Seeker Dynamics block shown in Figure 2.4 receives its inputs, H.L.O.S.(ϕ) and V.L.O.S.(θ) from the ASCM Digital model. These inputs have a random noise added by a Noise Generator block. After the addition of noise, the H.L.O.S. and V.L.O.S. are processed by the Seeker Head in order to calculate the new seeker dish position. When the seeker dish reaches its final position, the errors in both horizontal and vertical channels are minimized. The Seeker Head Azimuth and Elevation Channels are second order linear systems.

The calculated position of the antenna is fed back through a field-of-view saturation block whose limit values are set by the variables ***sekhlim*** (± 15°) for the horizontal channel and ***sekvlim*** (± 15°) for the vertical channel. The system outputs to the AutoPilot are the seeker horizontal L.O.S. rate ($\dot{\phi}$) and the seeker vertical L.O.S. rate ($\dot{\theta}$).

c. Noise Definitions

The noise concepts for this model as well as how the noise value is calculated from the selected seeker parameters for the horizontal and vertical channels, are discussed here and in the next sub-sub-section.

In the missile and captive-carry model, two basic types of seekers are used. The first is the conical scan on receive only seeker (COSRO[1]) and the second is a monopulse seeker[2]. In Table 2.1 the estimated seeker parameters for the two seeker types are introduced [Ref. 4]. Table 2.1 also presents the seeker model variables and their default values for our noise calculations. The signal-to-noise ratio for a single pulse $(S/N)_m$ as a function of the distance between the seeker and the target is

---

[1] A COSRO seeker [Ref. 2] is defined as "An antenna…with a radiant element which is caused to move in a small circular orbit about the focus of the antenna with or without

$$(S/N)_m = \frac{P_p G\ \sigma\ e^{-2\alpha R} \lambda^2}{(4\pi)^3 R^4 (kTBF)} \tag{13}$$

where,

P_p = peak power

G = antenna gain, same gain for transmission and reception

σ = target radar cross section

α = attenuation coefficient

R = distance between missile and target

λ = wavelength

k = Boltzman's constant = 1.380658×10^{-23} Joules K^{-1}

T = receiver temperature in Kelvin

KT = 4.14×10^{-21} Watts / Hz at 300 K

B = receiver noise bandwidth

---

change of polarization. The radiation pattern is in the form of a beam that traces out a cone centered on the reflector axis."

[2] A monopulse seeker [Ref. 3] is defined as "(...)A type of tracking radar that permits the extracting of tracking error information from each received pulse and offers a reduction in tracking errors as compared to a conical-scan system of similar power and size."

F = noise figure[3]

With Eq.(13) being presented, the factors that affect the precision of the angular measurement for a COSRO and monopulse seeker can be evaluated. For the COSRO seeker, two major factors affect the seeker angular precision: the error caused by thermal noise over n integrated pulses by the servo loop and the scintillation error. The error caused by thermal noise over n integrated pulses by the servo loop in each coordinate (azimuth and elevation) is given by the formula below from [Ref. 6]

$$\sigma_\theta = \frac{\theta_{3dB}\sqrt{L_k}}{k_s\sqrt{(S/N)_m n}} \tag{14}$$

where,

L_k = cross over loss due to the beam squint[4]

k_s = conical scan error slope

$(S/N)_m$ = single pulse signal-to-noise ratio

n = number of pulses integrated

θ_{3dB} = half power beam width

---

[3] In [Ref. 5], noise figure is defined as “A figure of merit…given by the ratio of the signal-to-noise ratio at the input, S_i/N_i divided by the signal-to-noise at the output, S_o/N_o.

[4] Crossover loss due to beam squint is a reduction of the gain due to the target being tracked from the beam peak.

Estimated Parameter	COSRO	Monopulse	Variable Names c – COSRO m - monopulse
Peak Power, P_p (kW)	250	30	***ppc / ppm***
Frequency, f (GHz)	9	17	***freqc / freqm***
Antenna gain, G (dB)	33	23.4	***antgainc / antgainm***
Half Power Beam Width, θ_{3dB} (°)	4.5	8	***HPc / Hpm***
Noise Bandwidth, B (MHz)	10	10	***noibwc / noibwm***
Noise Figure, F (dB)	11	9.5	***noifigc / noifigm***
Range resolution (meters)	100	100	***rrc / rrm***
Number of integrated pulses, n	100	100	***numpulc / numpulm***
First side lobe ratio (dB)	- x -	24	***fslrm***
Target radar cross section, σ (m^2)	3000	3000	***crossc / crossm***
Attenuation Coefficient, α (dB/km)	0.055	0.055	***alphac / alpham***

Table 2.1. Estimated Seeker Parameters (After [Ref. 5])

Figure 16 shows k_s and L_k as a function of the normalized squint (offset) angle, θ_k / θ_{3dB}.

The scintillation error, i.e., the reduction of the gain because the target is tracked off the beam peak, is given by [Ref. 6]

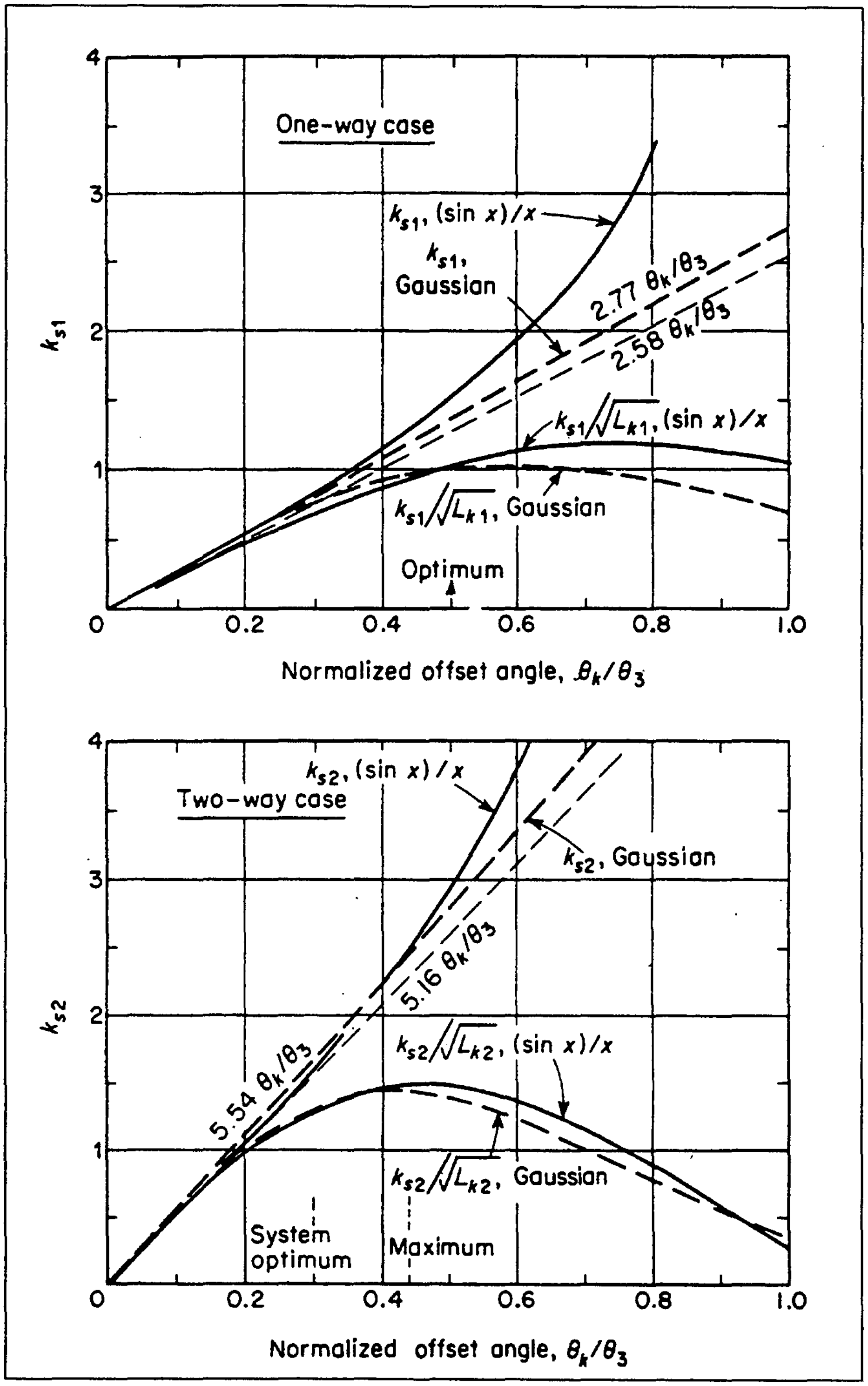


Figure 2.16. Normalized Offset Angle [Ref. 6, p. 389]

$$\sigma_S = 0.225\left(\frac{\theta_{3dB}}{f_S k_S}\right)\sqrt{\frac{\beta_n}{t_c'}} \qquad \textbf{(15)}$$

where,

β_n = servo bandwidth

f_s = nutation frequency

t_c' = envelope correlation time

The total error in the precision of the angular measurement for a conical scan seeker is found by adding Eqs. (14) and (15). The error in the angular measurements, $\delta\theta$ (vertical) and $\delta\phi$ (azimuth), is assumed to be Gaussian distributed and given by

$$\delta\theta = \delta\phi = \frac{1}{\sqrt{2\pi(\sigma_S^2 + \sigma_\theta^2)}} e^{-\frac{1}{2}\left(\frac{\theta - \theta_{TRUE}}{\sigma_S^2 + \sigma_\theta^2}\right)^2} \qquad \textbf{(16)}$$

where θ_{TRUE} is the current L.O.S. within the simulation, and σ_θ is a function of the $(S/N)_m$.

For the monopulse seeker, the precision of the angular measurement in a thermal noise environment is given by

$$\sigma_{\theta\,MP} = \frac{\theta_{3dB}}{k_m\sqrt{2(S/N)_m n}} \qquad \textbf{(17)}$$

where k_m is the difference slope and n is the number of pulses being integrated. The value of k_m can be found from the graph shown in Figure 2.17 as a function of the first side lobe ratio. For a first side lobe ratio equal to 24 dB (Table 2.1) the value of k_m is approximately 1.9. The beam shape of the antenna is assumed to be Gaussian.

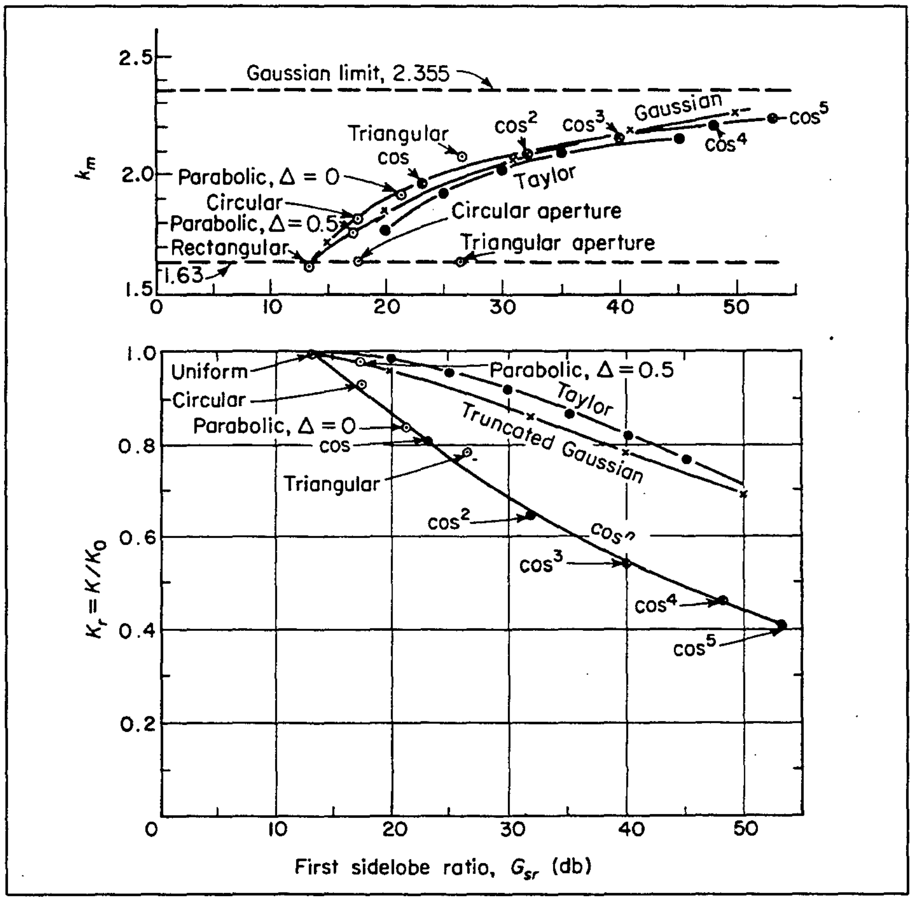


Figure 2.17. Difference Slope Versus Sidelobe Level [Ref. 6, p. 403]

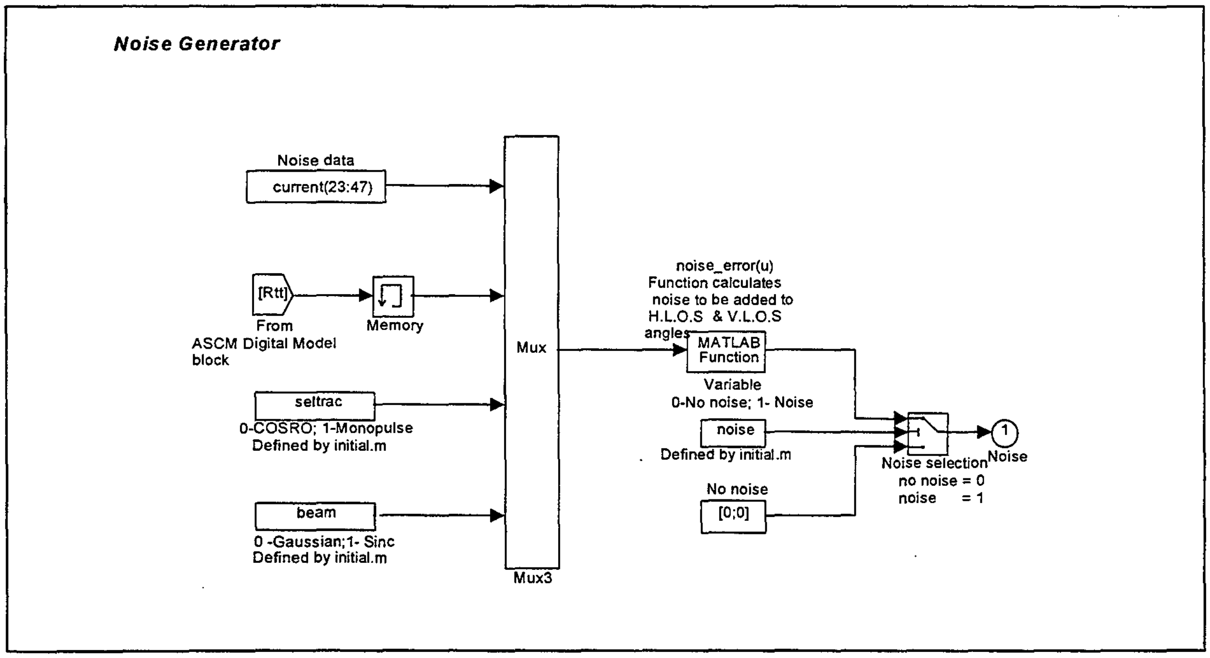
The error in the angular measurement, δ_θ or δ_ϕ, is assumed to be Gaussian distributed and given by

$$\delta\theta = \delta\phi = \frac{1}{\sqrt{2\pi(\sigma_{\theta MP})^2}} e^{-\frac{1}{2}\left(\frac{\theta-\theta_{TRUE}}{\sigma_S^2+\sigma_\theta^2}\right)^2} \qquad \textbf{(18)}$$

where θ_{TRUE} is the current L.O.S. within the simulation and $\sigma_{\theta MP}$ is a function of the $(S/N)_m$. Eqs. 13, 14, 15, 16, 17 and 18 as well as the values in Table 2.1 are used for the noise calculation in the Noise Generator block (*noise_error.m*, Appendix C).

d. *Noise Generator*

The Noise Generator block in Figure 2.18 is the Seeker Dynamics sub-block responsible for generating the noise to be added to the horizontal and vertical L.O.S.. It receives as inputs the vector ***current***, the distance between the threat (missile or captive-carry) and the selected target or the Nulka decoy (function of the ***ttg***), and the general switches ***seltrac*** and ***beam***. The vector ***current*** introduces the 25 values related to the variables established in Table 2.1 for the COSRO and monopulse seekers. Those values are stored in the initialization structure ***I*** and their values are assigned to the vector ***current*** as a function of the simulation number selected in the GUI (Graphical User Interface) *Menu*. The variable ***Rtt*** sends the position differences in X, Y and Z directions between the threat and the target from the ASCM Digital model.



SUMMARY:

BLOCK: Noise Generator

SUB-BLOCK(s): None.

INPUT(s): Vector current. It introduces the following parameters:

For a COSRO Seeker - ***ppc, freqc, antgainc, HPc, noibwc, rrc, numpulc, nosangc, envc, nutfreqc, serbwc, crossc, alphac***;

For a monopulse Seeker - ***ppm, freqm, antgainm, HPm, noibwm, rrm, fslrm, crossm, alpham;***

Rtt - distance between the threat and the selected target

seltrac - general switch that allows selection between the COSRO or monopulse seeker,

beam – general switch that allows selection between Gaussian or sinc beam shape for the COSRO seeker,

noise – general switch that enables or not the noise calculation results out of the Noise Generator block.

OUTPUT(s): Vector 2x1 $[\delta\phi;\delta\theta]$ introduces random noise to the horizontal and vertical L.O.S in the block Seeker Dynamics.

AVAILABLE FUNCTION(s): *noise_error.m* (See Appendix C)

Figure 2.18. Noise Generator Model Block

The general switch ***seltrac*** allows selecting between the type of seeker available in the model (COSRO seeker or monopulse seeker). The default seeker was chosen to be the COSRO seeker. When the COSRO seeker is selected, the value of ***seltrac*** is set to zero and when the monopulse seeker is selected its value goes to one. The general switch ***beam*** allows selection between the Gaussian (default, ***beam*** = 0)or the sinc function beam shape (***beam*** = 1).

The above values are combined in one matrix (30,1) by a Simulink© multiplexer and the resultant vector is introduced in the function *noise_error.m* shown in Appendix C. Depending on the value of ***noise***, the results from the Noise Generator block are sent (***noise*** = 1) or not (***noise*** = 0) to the Seeker Dynamics block to be added to the horizontal and vertical L.O.S..

The *noise_error.m* calculates the distance between the threat and the target, which is the range R in Eq. (13). As a second step, it assigns the parameter values for the COSRO and monopulse seeker to auxiliary variables for further calculations of the error in the precision of the angular measurements. The next step is to calculate the signal (power) received by the seeker with the parameters of the chosen seeker (defined by the value of ***seltrac***). After that, the noise is calculated and finally the $(S/N)_m$ for a single pulse is calculated.

If the selected seeker is COSRO, a MATLAB© function (*polyfit*) is used to extract the values of k_S shown in Figure 2.16 in order to calculate Eqs. 14 and 15. The values of k_S depend on which seeker is used (defined by the variable ***beam***). For the monopulse seeker, the same MATLAB© function is used to get the value of k_m used in Eq. 17 from the curves presented in Figure 2.17.

Eqs. 14 and 15 are used to get the standard deviations due to both thermal and scintillation errors for the COSRO seeker. For the monopulse seeker, Eq. 17 is used to calculate the standard deviation due to the thermal noise. The errors of the angular measurement have a Gaussian distribution. The mean is zero and the standard deviations given by Eqs. 14 and 15 or 17. i.e.,

$$\text{error} = \text{Normal}\,(\theta_{TRUE}, \sigma_\theta). \qquad \textbf{(19)}$$

Therefore, horizontal and vertical errors from a normal distribution are generated as shown above for each measured angle. These errors, after calculated, are added to the values of ϕ and θ in the Seeker Dynamics block, causing the seeker to behave statistically as a real system.

2. Autopilot

The Autopilot is the block responsible for filtering the horizontal and vertical accelerations that are used in the missile dynamics to calculate the new missile position. Before describing the Autopilot block presented in Figure 2.19, an analysis of how the model parameters in this block affect the missile performance is required.

a. Autopilot Dynamics Analysis

For the Autopilot dynamic analysis, this study will concentrate on the horizontal channel, knowing that the results can be extended to the vertical channel as well. The model variables in this block are ***ta1*** forward gain and ***ta2*** feedback gain for the Commanded Horizontal Acceleration. For Commanded Vertical Acceleration the variables are ***tb1*** forward gain and ***tb2*** feedback gain for the vertical channel.

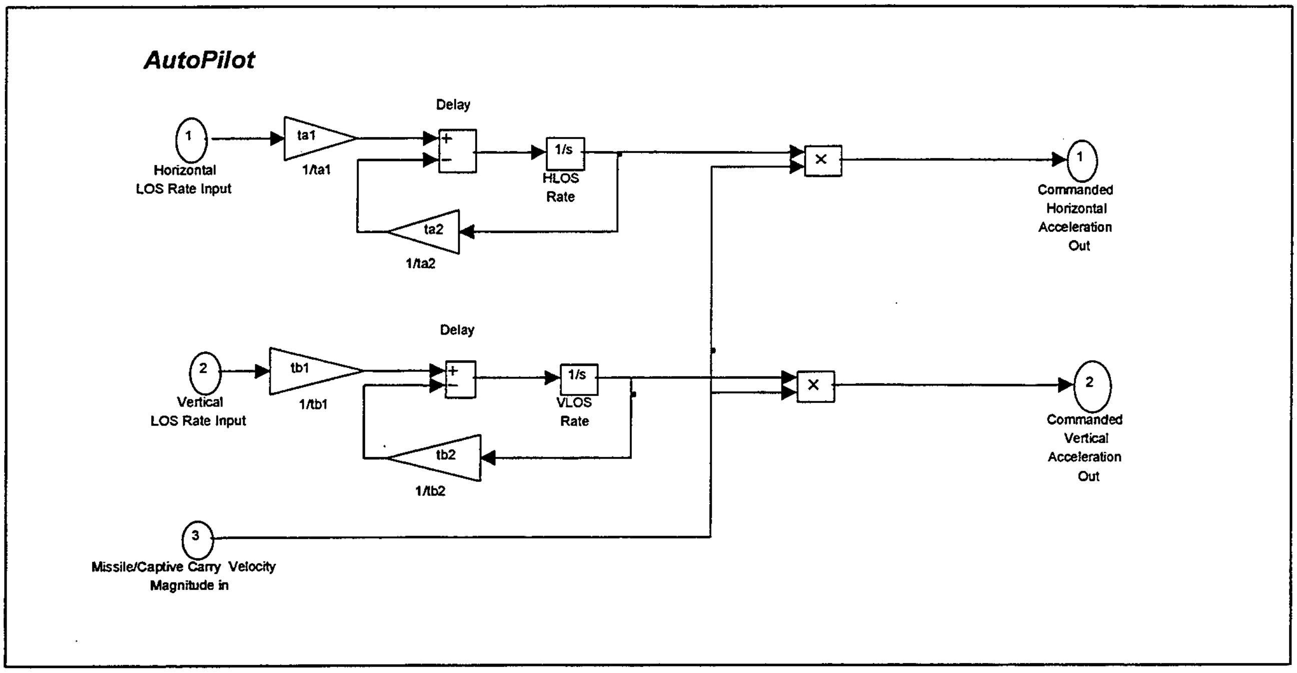
A block diagram of the horizontal channel is shown in Figure 2.20 from which the closed loop transfer function is obtained:

$$\frac{\dot{\lambda}_i}{\dot{\lambda}_o} = \frac{1/ta1}{s + (1/ta2)} \qquad \textbf{(20)}$$

This is a first order system with one pole at $(-1/ta2)$ and a gain of $(1/ta1)$. Using the default values ***ta1=ta2***=0.5, the single pole is at –2 and the gain equals 2. The graph shown in Figure 2.21 shows the pole-zero diagram for the default values. The next step is to see what happens when the values of ***ta1*** and ***ta2*** are varied. Making the root locus shown in Figure 2.22 from the open-loop transfer function, when the system gain value goes to infinity, the single pole goes toward the imaginary axis, but, on the other hand, when its value goes to zero, the system pole goes to $-\infty$.

The root locus analysis and Figure 2.20 shows that the closed loop system output ($\dot{\lambda}_o$) is delayed from the system input ($\dot{\lambda}_i$) by an amount (1/***ta2***). The larger the ***ta2*** value the smaller the delay of the output response to the system input. The smaller the ***ta2*** value the larger the delay until the system output reaches the value of the system input. The ***ta1*** value can be understood as a system gain. The larger the ***ta1*** value the smaller the system amplification and the smaller the ***ta1*** value, the higher the system amplification. Thus the ***ta2*** value affects the time in which the commanded horizontal acceleration will be sent to the missile dynamics. If it takes a long time (***ta2*** small), the necessary acceleration to generate the missile position in the Missile/Captive-Carry Dynamics block may not be enough to reposition the missile in the correct path. On the other hand, a large value of ***ta2*** makes the missile oscillate when trying to track each slight variation in the horizontal L.O.S. rate. A large ***ta1*** value has a tendency to reduce the amplitude of the horizontal L.O.S. rate, generating, as expected, a commanded horizontal acceleration output in a amplitude lower than the one requested to reposition correctly the missile toward the target, and thus undercorrecting it. For small value of ***ta1*** the inputs to the missile dynamics are larger than necessary and thus causing an overcorrection in the missile position. The above results are easily extended to the vertical channel as well.

Finally, the analysis above can be verified in the missile trajectories when ***ta1*** and ***ta2*** are changed. Figure 2.23 shows the effects of changing the ***ta1*** value to 0.25 and comparing it with the default value (0.5), and also shows the same comparison when the ***ta1*** value is changed to 4. Figure 2.24 shows the same comparison except that the variable is ***ta2***. Figures 2.25 and 2.26 make the same comparison for the vertical channel, but the variables being analyzed are ***tb1*** and ***tb2***. In the vertical channel the results are more pronounced.



SUMMARY:

BLOCK: AutoPilot

SUB-BLOCK(s): None.

INPUT(s): Horizontal and Vertical L.O.S. from Seeker Dynamics block, Missile/Captive Carry Velocity Magnitude from block Missile /Captive-Carry Dynamics.

OUTPUT(s): Commanded Horizontal and Vertical Acceleration to the Missile/Captive-Carry Dynamics block

AVAILABLE FUNCTION(s): None.

Figure 2.19. AutoPilot Model Block

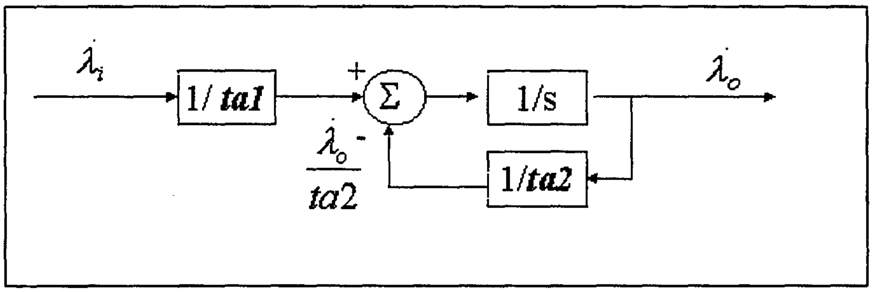


Figure 2.20. Block Diagram of the Commanded Horizontal Acceleration

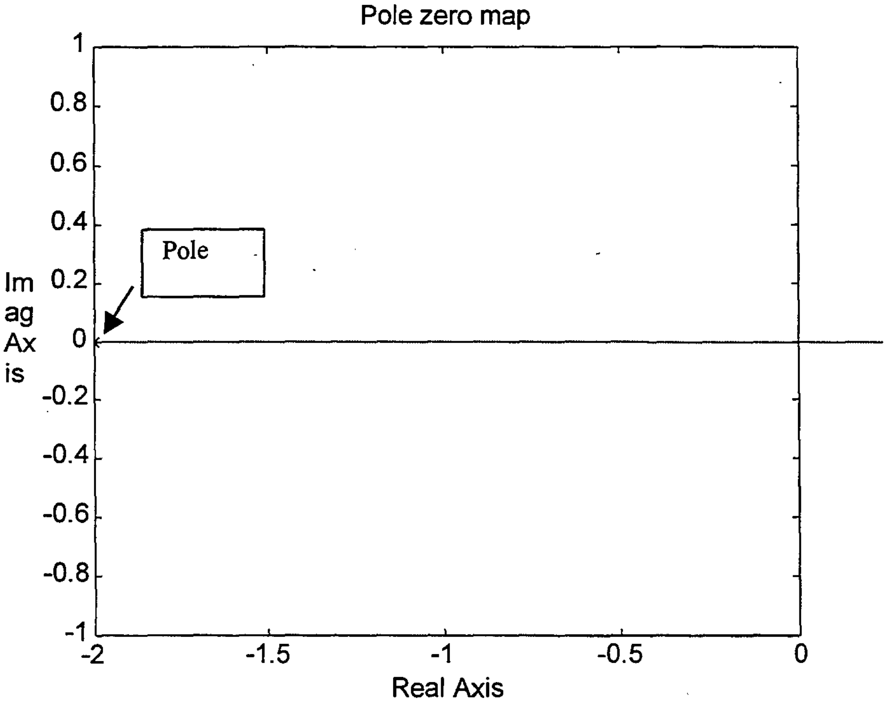


Figure 2.21. Pole-zero Diagram of the Commanded Horizontal Acceleration

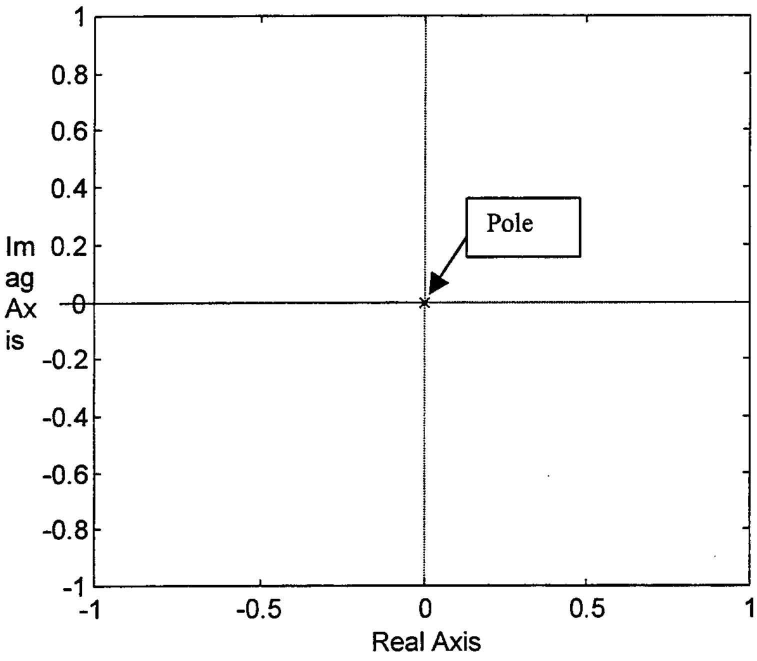


Figure 2.22. Horizontal Commanded Acceleration Root Locus

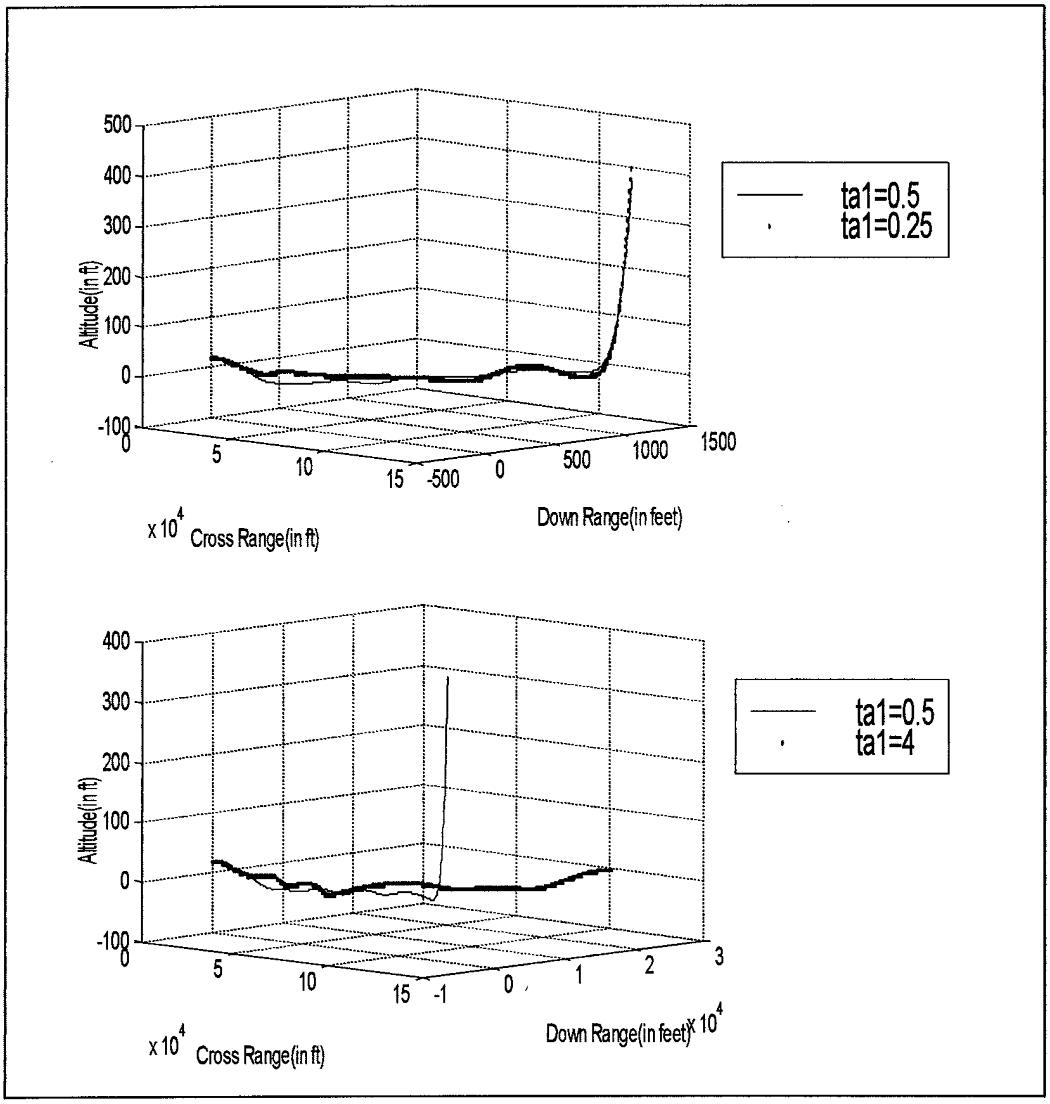


Figure 2.23. Missile Trajectory Effects Due to *ta1* Variation

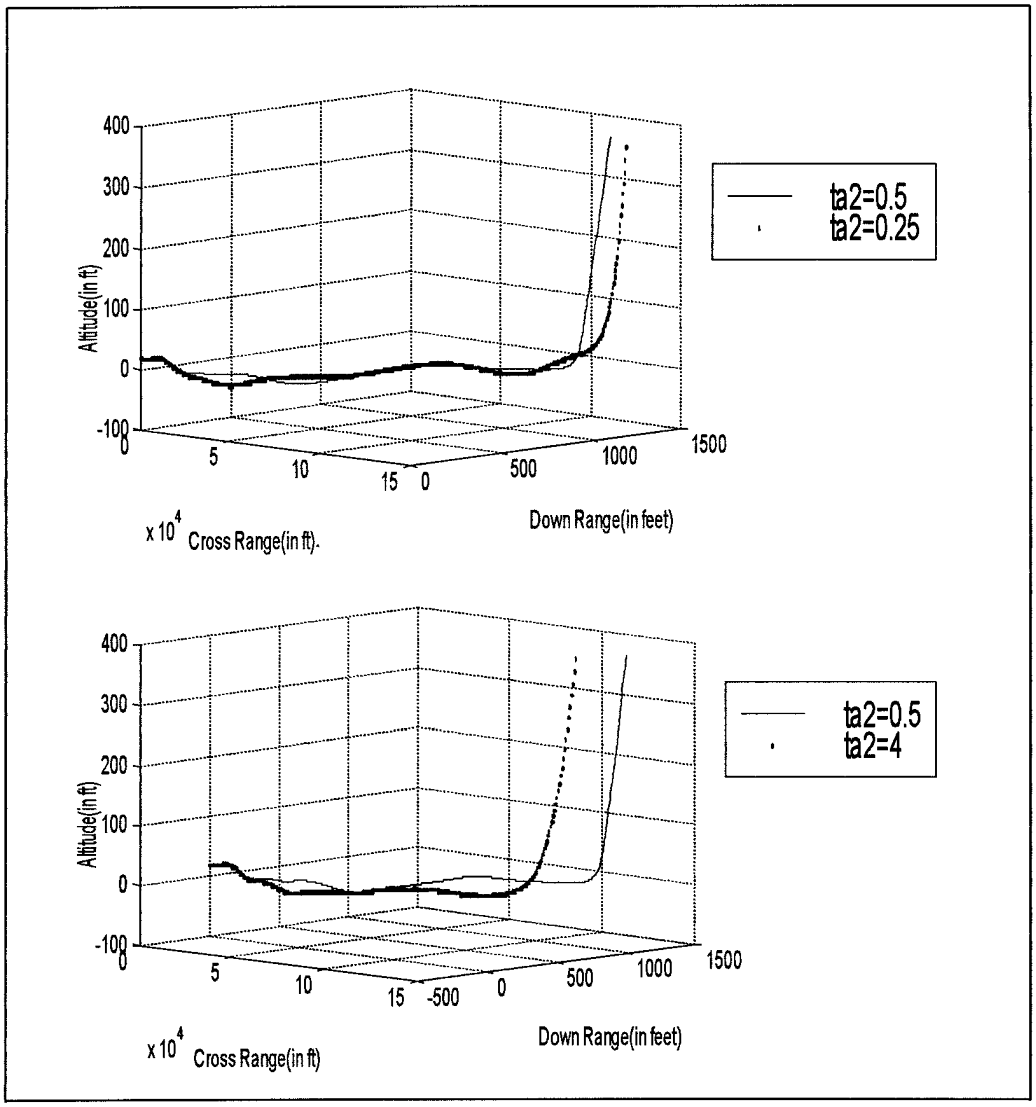


Figure 2.24. Missile Trajectory Effects Due to *ta2* Variation

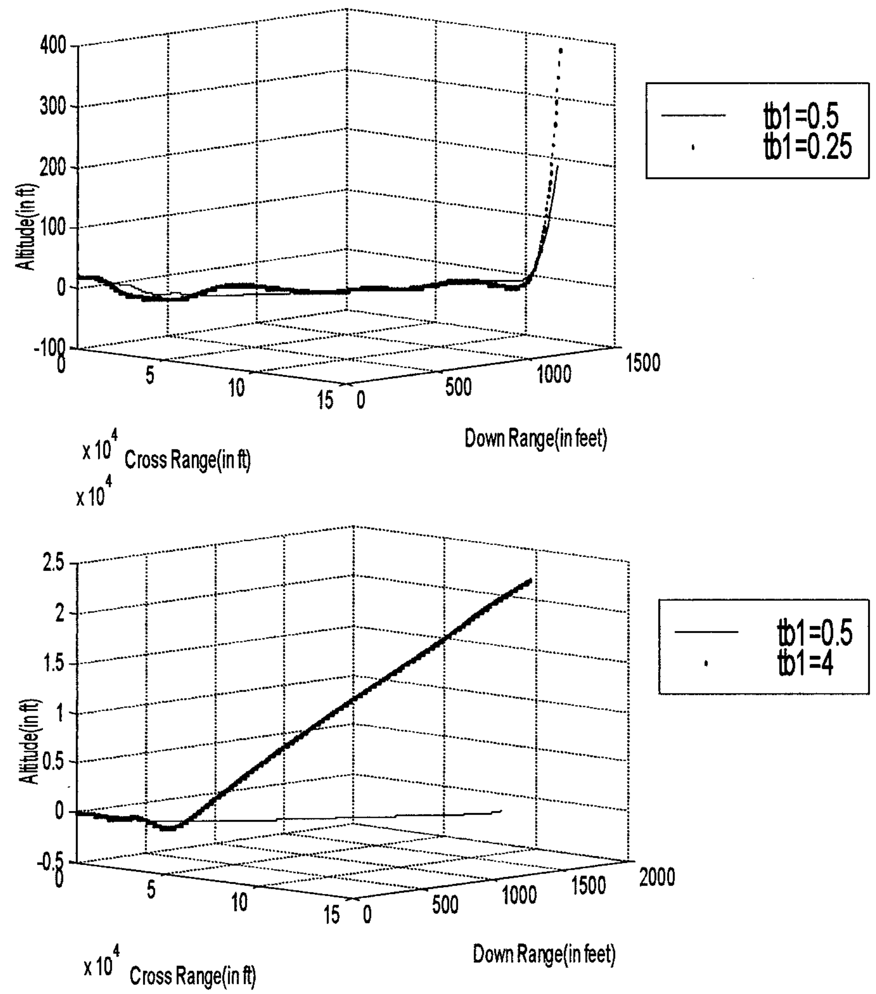


Figure 2.25. Missile Trajectory Effects Due to *tb1* Variation

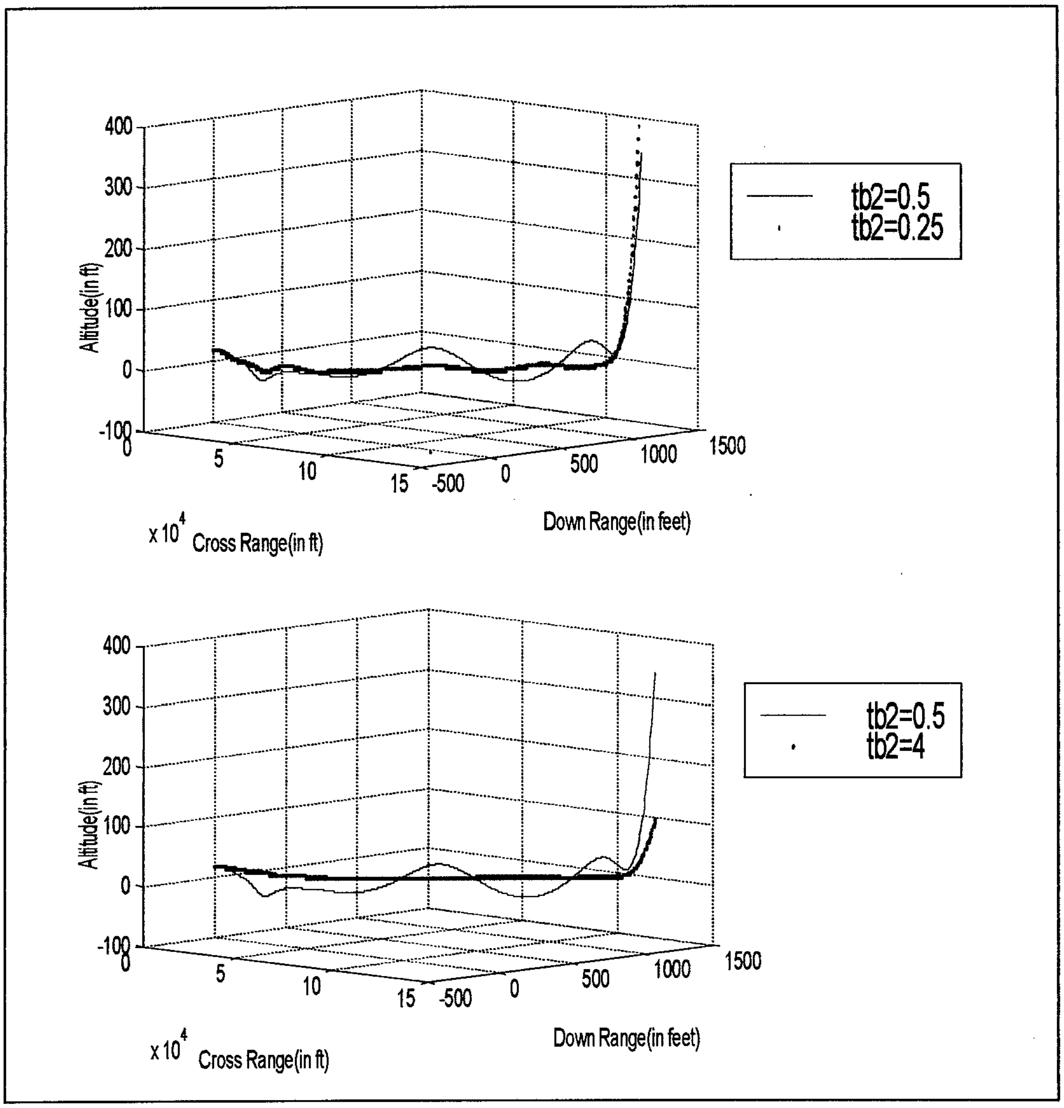


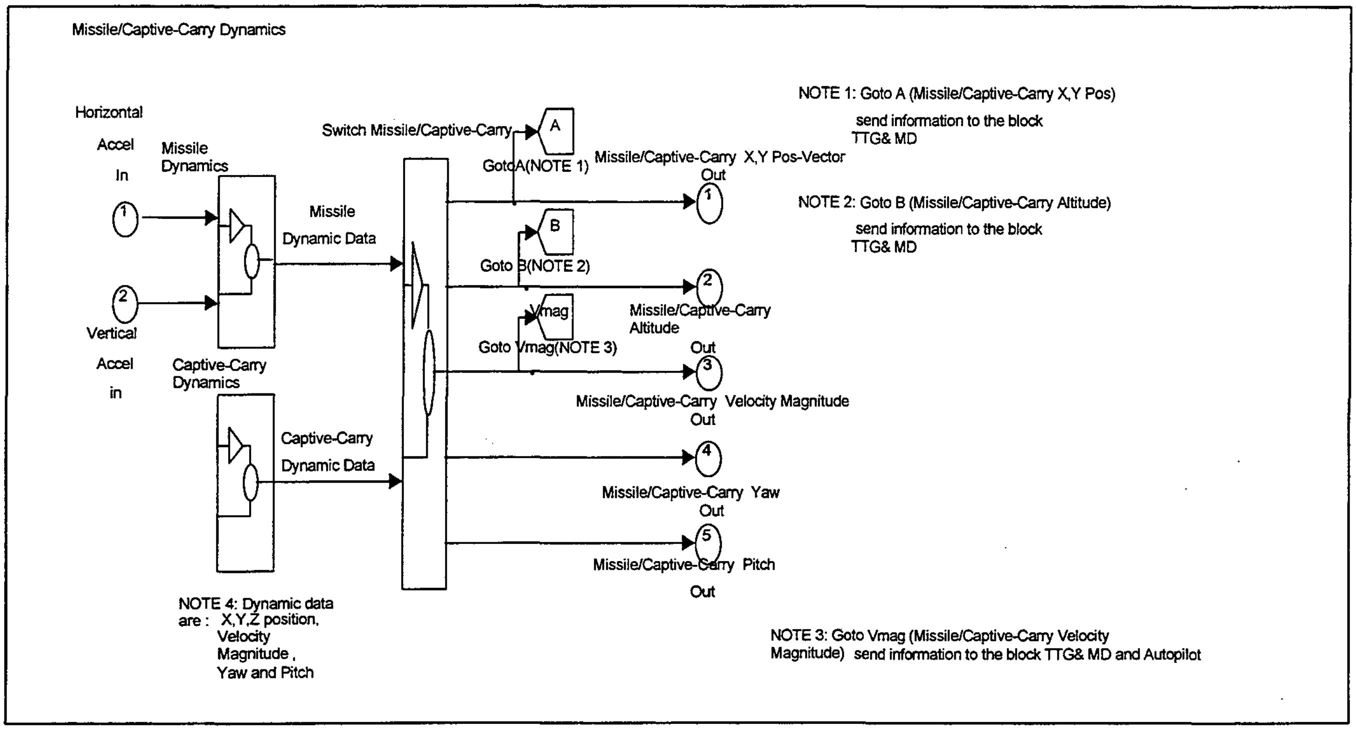
Figure 2.26. Missile Trajectory Effects Due to *tb2* Variation

b. AutoPilot Description

The AutoPilot block is a 3 input block (Figure 2.19). It receives the horizontal and vertical rates from the Missile/Captive-Carry model and transforms them into accelerations by multiplying the angular rates (rad/sec) with the missile/captive-carry magnitude velocity (ft/sec). The results are accelerations in the horizontal and vertical channels that are sent to the Missile Dynamics. As a last comment about this block, it can be noted that, for both channels, there are delays between the acceleration rate generated by the missile seeker and the missile dynamic response.

3. Missile/Captive-Carry Dynamics

The Missile/Captive-Carry Dynamics block shown in Figure 2.27 is the system responsible for generating the threat dynamics (position, velocity magnitude, yaw and pitch) to the ASCM Digital model. The system is composed of three blocks: the Missile Dynamics, the Captive-Carry Dynamics and the Switch Missile/Captive-Carry. The system input is the commanded horizontal and vertical accelerations, but these are only used by the Missile Dynamics sub-block. There are three Simulink© GOTOs that send the selected threat position and magnitude velocity information to the TTG and Miss-Distance block.


Missile/Captive-Carry Dynamics
Horizontal Accel In
1
2
Vertical Accel in
Missile Dynamics
Captive-Carry Dynamics
Missile Dynamic Data
Captive-Carry Dynamic Data
Switch Missile/Captive-Carry
A
Goto A(NOTE 1)
B
Goto B(NOTE 2)
Vmag
Goto Vmag(NOTE 3)
Missile/Captive-Carry X,Y Pos-Vector Out
1
2
Missile/Captive-Carry Altitude Out
3
Missile/Captive-Carry Velocity Magnitude Out
4
Missile/Captive-Carry Yaw Out
5
Missile/Captive-Carry Pitch Out
NOTE 1: Goto A (Missile/Captive-Carry X,Y Pos) send information to the block TTG& MD
NOTE 2: Goto B (Missile/Captive-Carry Altitude) send information to the block TTG& MD
NOTE 3: Goto Vmag (Missile/Captive-Carry Velocity Magnitude) send information to the block TTG& MD and Autopilot
NOTE 4: Dynamic data are : X,Y,Z position, Velocity Magnitude , Yaw and Pitch

SUMMARY:

BLOCK: Missile/Captive-Carry Dynamics

SUB_BLOCK: None.

INPUT(s): Horizontal and Vertical Accelerations from the AutoPilot Block.

OUTPUT(s): X, Y, Z threat (missile or captive-carry) position, threat velocity magnitude, Threat Yaw and Pitch.

AVAILABLE FUNCTION(s): None.

Figure 2.27. Missile/Captive-Carry Dynamics Block

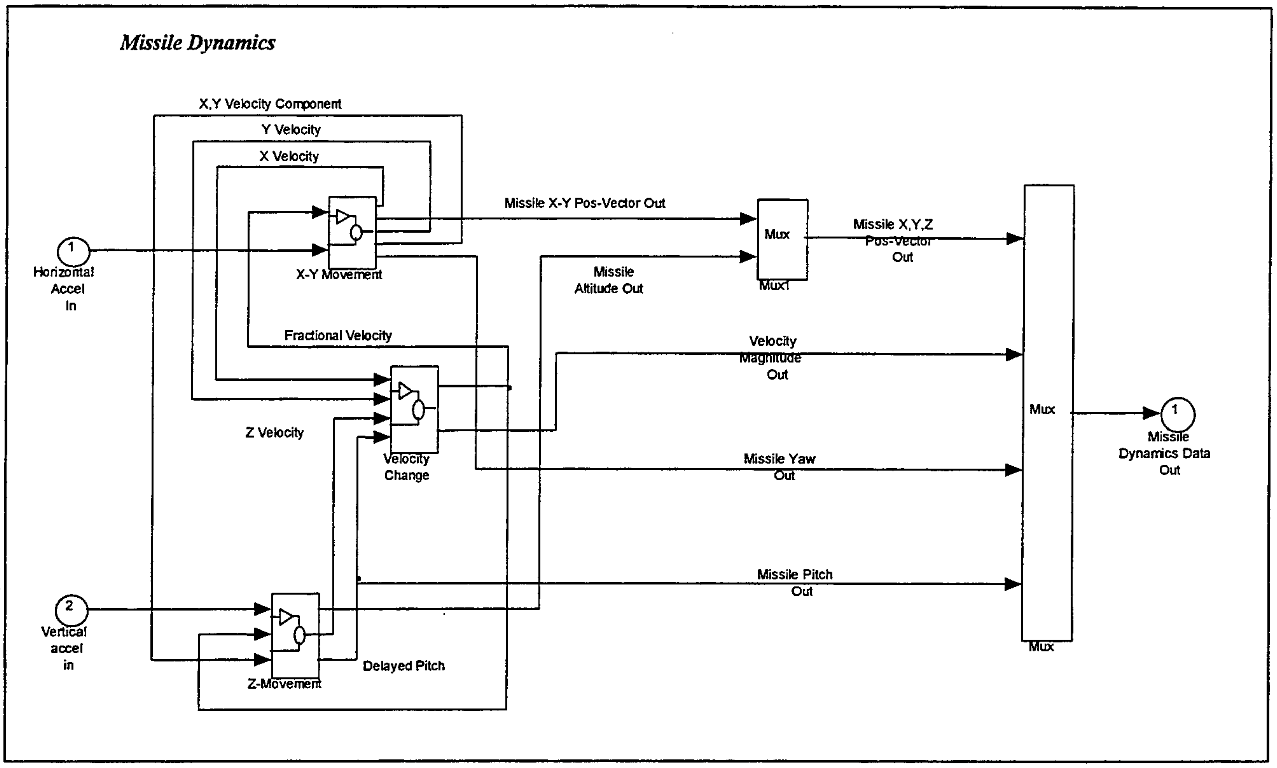
The magnitude velocity is also sent to the AutoPilot block.

a. Missile Dynamics Analysis and Description

The Missile Dynamics model in Figure 2.28 takes the accelerations from the AutoPilot and calculates the next position of the missile. The conversion is accomplished using three sub-blocks: X-Y Movement, Velocity Change and Z-Movement. The three sub-blocks also calculate the pitch and yaw angles and the new missile velocity magnitude. Due to the inter-relationship between the three sub-blocks, the study of this block will be a little different compared with the previous ones. Here the model is described and an analysis of the effects of the missile dynamics variables ***tm*** (acceleration delay for X_Y movement), ***tmv*** (acceleration delay for Z movement) and ***tv*** (velocity change delay) in the missile trajectory are carried out.

The Missile Dynamics-Velocity Change sub-block is shown in Figure 2.29. This sub-block receives four inputs: the X, Y and Z velocity components from the X-Y and Z Movement sub-blocks, respectively, and the pitch information also from the Z Movement sub-block. The three velocity components are combined in a vector by a multiplexer and from there the velocity magnitude is obtained. The velocity magnitude is further adjusted by Changed Velocity Magnitude sub-block taking into account the missile pitch information as

$$\text{vel} = 1322 - ((\text{pitch}-0.01) \times 575) \qquad \textbf{(21)}$$



SUMMARY:

BLOCK: Missile Dynamics

SUB-BLOCKS: X-Y Movement
Velocity Change
Z Movement

INPUT(s): Horizontal and Vertical Acceleration from the AutoPilot block.

OUTPUT(s): Missile dynamic data (position, velocity magnitude, yaw, and pitch).

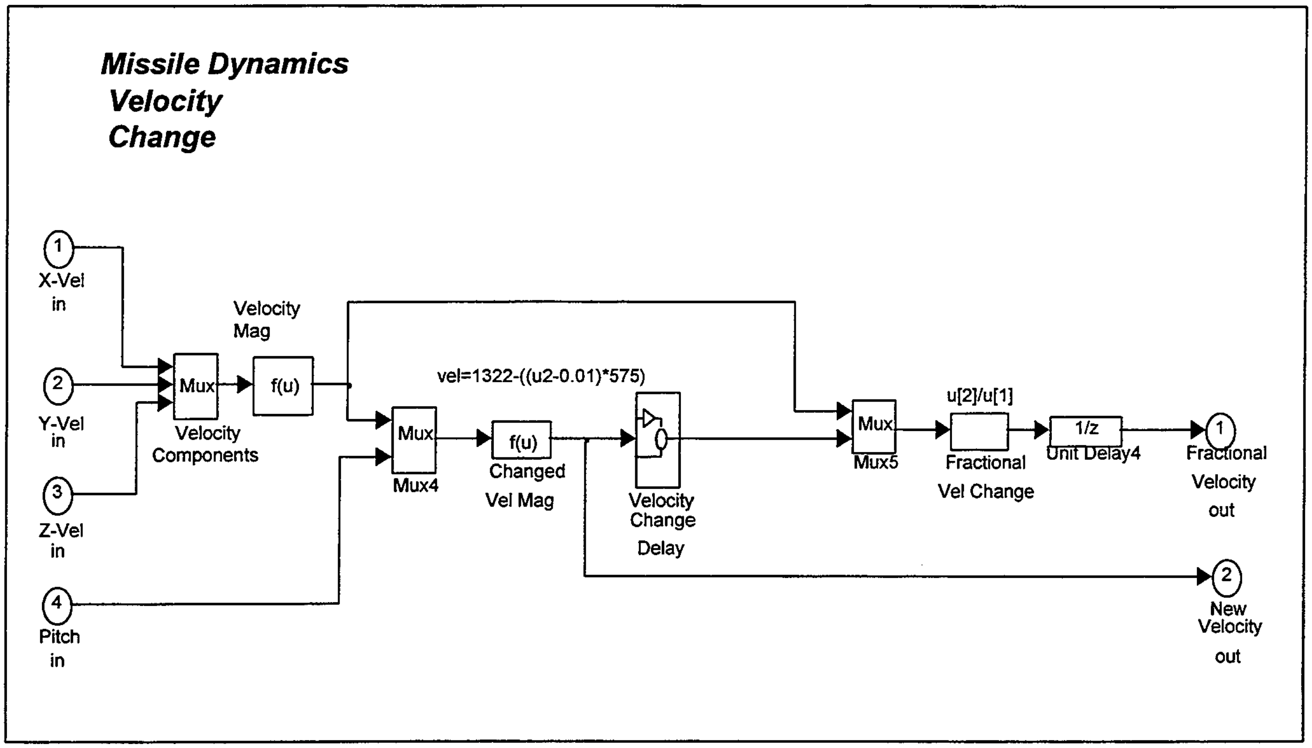
AVAILABLE FUNCTION(s): None.

Figure 2.28. Missile Dynamics Block

where the value 1322 is the missile speed in ft/sec. The negative component of Eq. 21 is a correction factor due to pitch induced drag.

The updated velocity magnitude is sent to the Missile Dynamics block and to the Velocity Change Delay sub-block (missile inertia). After the delay, the fractional velocity is calculated by dividing the updated velocity due to the pitch. The fractional velocity change is sampled and delayed and represents the delay between the velocity calculation for each coordinate and its effective use by the missile components responsible for its repositioning. The Velocity Change Delay block diagram is shown in Figure 2.30 and has a forward and feedback gain. The closed-loop transfer function is a first order system with one pole at –***tv***, and using the default value of ***tv***=0.5, the pole is at –0.5. The larger is the value of ***tv***, the larger the missile inertia becomes. Figure 2.31 shows the missile trajectory for ***tv***=0.25, 4.0 and 0.5 (default).

The second sub-block, the X-Y Movement sub-block, has two inputs and is shown in Figure 2.32. One is the fraction velocity generated in the block Velocity Change and the other is the horizontal acceleration from the AutoPilot block. These two inputs generate the missile X and Y velocity components, the missile X-Y position and the missile yaw.



SUMMARY :

BLOCK : Missile Dynamics – Velocity Change

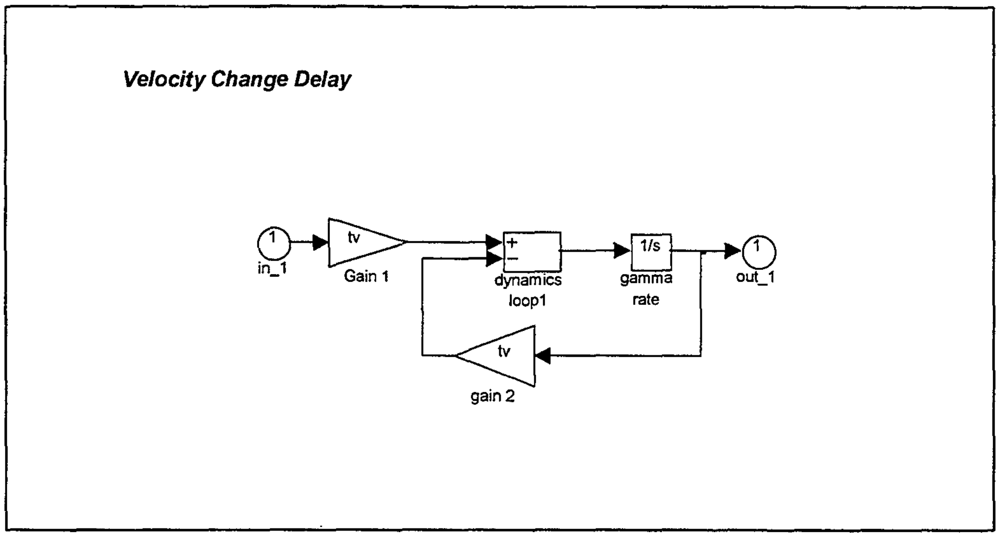
SUB-BLOCK(s): Velocity Change Delay

INPUT(s): X-Velocity, Y-Velocity from block X-Y Movement,
Z- Velocity ,and
Delayed pitch from block Z – Movement.

OUTPUT(s): Fractional Velocity to the blocks X-Y Movement and Z- Movement, and
Velocity Magnitude to the block Missile Dynamics.

AVAILABLE FUNCTION(s): None.

Figure 2.29. Velocity Change Sub-Block



SUMMARY:

BLOCK: Velocity Change Delay

SUB-BLOCK(s): None

INPUT(s): Changed magnitude velocity from block Velocity Change.

OUTPUT(s): Velocity delayed

AVAILABLE FUNCTION(s): None.

Figure 2.30. Velocity Change Delay Sub-Block

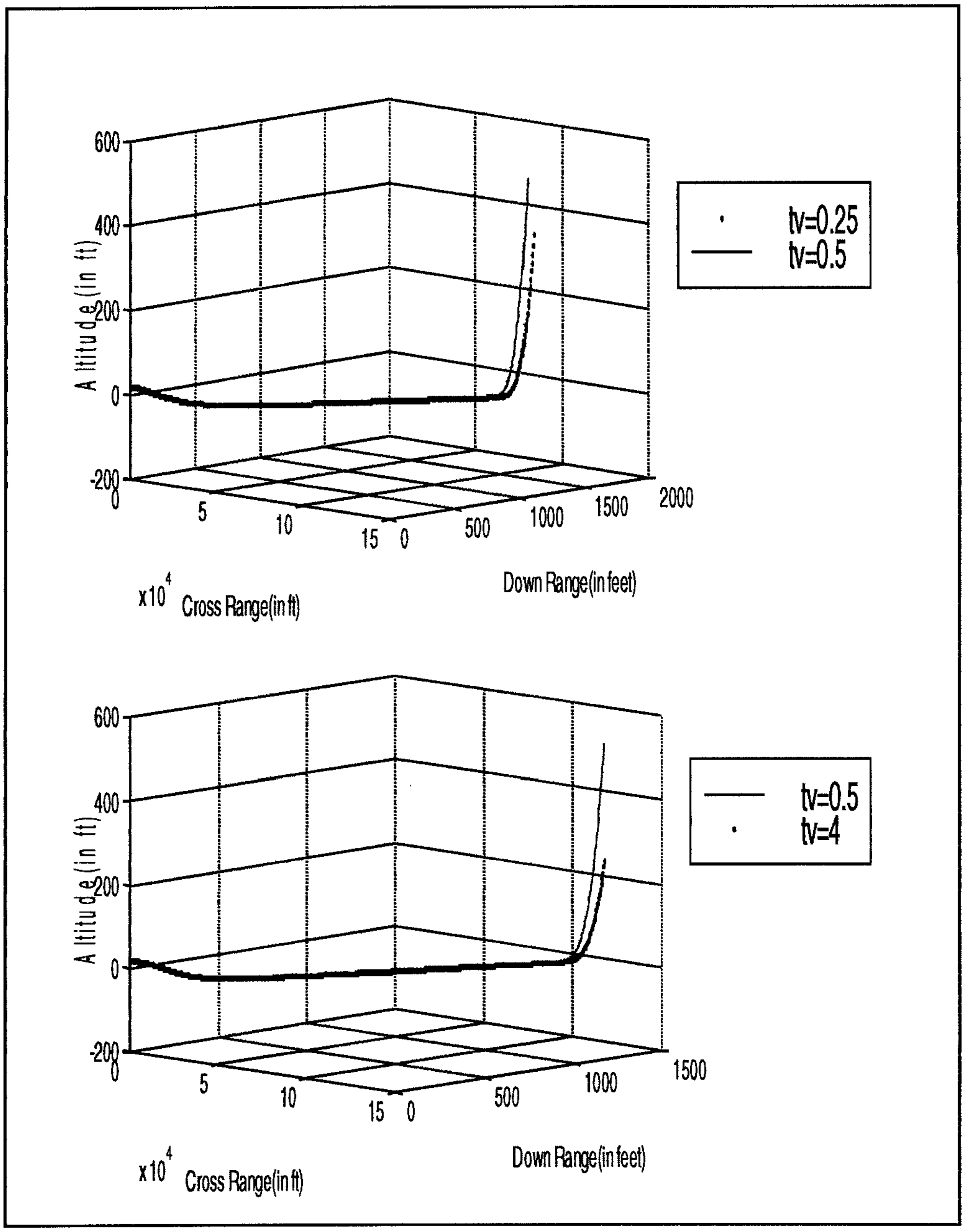
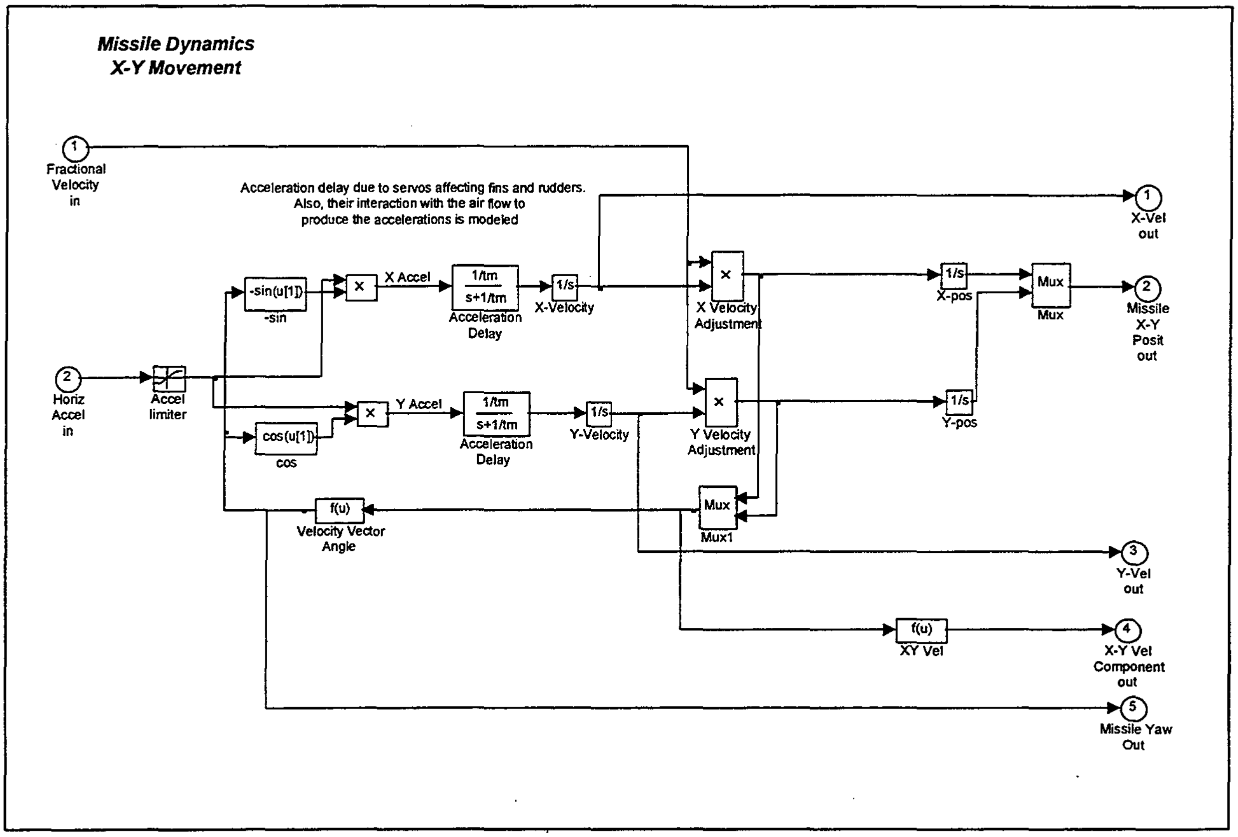


Figure 2.31. Missile Trajectory Effects Due to *tv* Variation



SUMMARY :

BLOCK: Missile Dynamics - X-Y Movement

INPUT(s): Fractional Velocity from block Velocity Change,
Horizontal Acceleration from Missile Dynamics block.

OUTPUT(s): X- Velocity, Y- Velocity to the block Velocity Change,
X-Y Velocity component to the block Z-Movement,
Missile X-Y position and missile yaw to the block Missile Dynamics.

AVAILABLE FUNCTION(s): None.

Figure 2.32. Missile Dynamics X-Y Movement

The horizontal acceleration is introduced in the block and passed by the Acceleration limiter block that limits the received horizontal acceleration between ± 130 ft/sec^2 and prevents the model from receiving accelerations not possible in the real world. The horizontal acceleration is then decomposed into its X and Y components by multiplying it with the sine and cosine of the current yaw. Both acceleration components are delayed by a first order system whose gain is 1/***tm*** and its pole is at –1/***tm***. These delays are due to the servos affecting the fins and rudders and also the interaction between fins and rudders with the airflow.

After the acceleration components being delayed, they are integrated to generate the missile X and Y velocity components used in the Velocity Change block. They are then multiplied by the fractional velocity and thus generate the fractional velocity in those directions and give the velocity increments required to reposition the missile towards the target. These increments are used in two ways. The first is to integrate them into a vector to get the new missile X-Y position that is sent to the Missile Dynamics block. The second is to combine them in a 2x1 vector. From that vector, the angle between them is obtained, which is the missile yaw, and the vector magnitude is the missile X-Y velocity magnitude component used in the Z-movement block. The calculated yaw is used as the output to the Missile Dynamics block and to get the acceleration components in the X-Y direction. The effects of ***tm*** in the missile trajectory can be understood without its root locus due to the similarities between ***tm*** and the AutoPilot delays. The larger the ***tm*** value the less the servo delays. The smaller the ***tm*** value the larger the delay. The same conclusion can be extended to the delay ***tmv*** in the Z

Movement sub-block. Figure 2.33 shows the effects in the missile trajectory using ***tm***=1, 8 and 2(default).

The Z Movement or Altitude of the Missile Flight Simulation sub-block receives three inputs: the vertical acceleration from the AutoPilot block, the fractional velocity from the Velocity Change sub-block and the X-Y velocity component from the X-Y Movement block. The vertical acceleration passes through a acceleration limiter as described before and, after that, it has its value multiplied by the cosine of the current pitch, which gives the acceleration value in the Z direction. The acceleration in the Z direction is delayed due to servos by a value 1/***tmv***. The delayed acceleration is then integrated and generates the velocity Z component. The velocity Z component is multiplied by the fractional velocity calculated in the Velocity Change sub-block giving the adjusted velocity in the Z direction.

The adjusted velocity is integrated again and the missile altitude is obtained. The adjusted velocity gives the Z velocity component which, combined with the X-Y velocity component in a vector by the Simulink© multiplexer, also gives the missile current pitch calculated from the angle between them. The pitch angle is used to get the vertical acceleration component in the Z direction and, after being delayed, it is sent to the Missile Dynamics block and to the Velocity Change sub-block. The effects of ***tmv*** in the missile trajectory shown in Figure 2.34 are the same effects of ***tm*** for the X-Y direction. The larger the ***tmv*** value the less the delay, the smaller the ***tmv*** value the larger the missile delay in the Z direction.

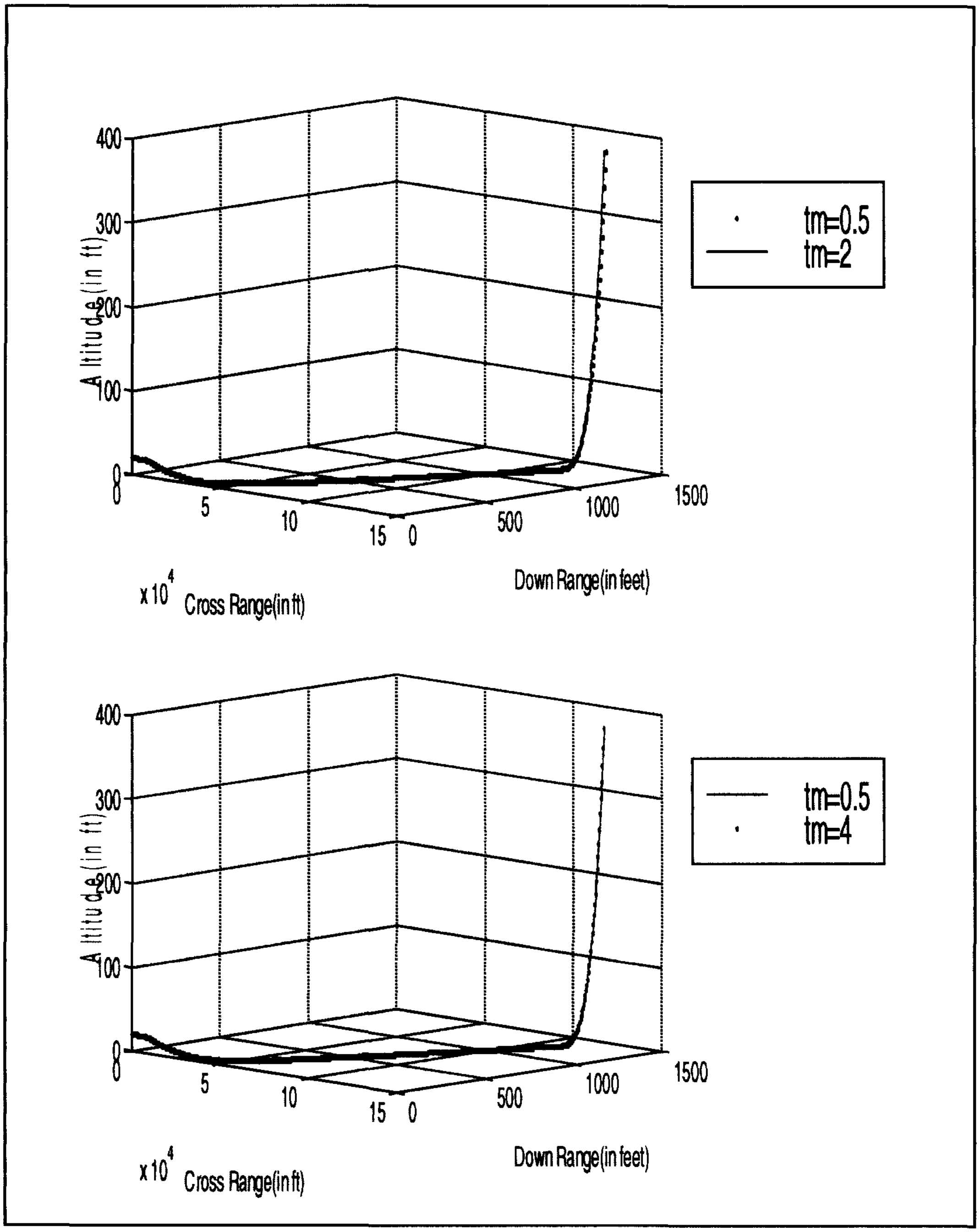


Figure 2.33. Missile Trajectory Effects due to *tm* Variation

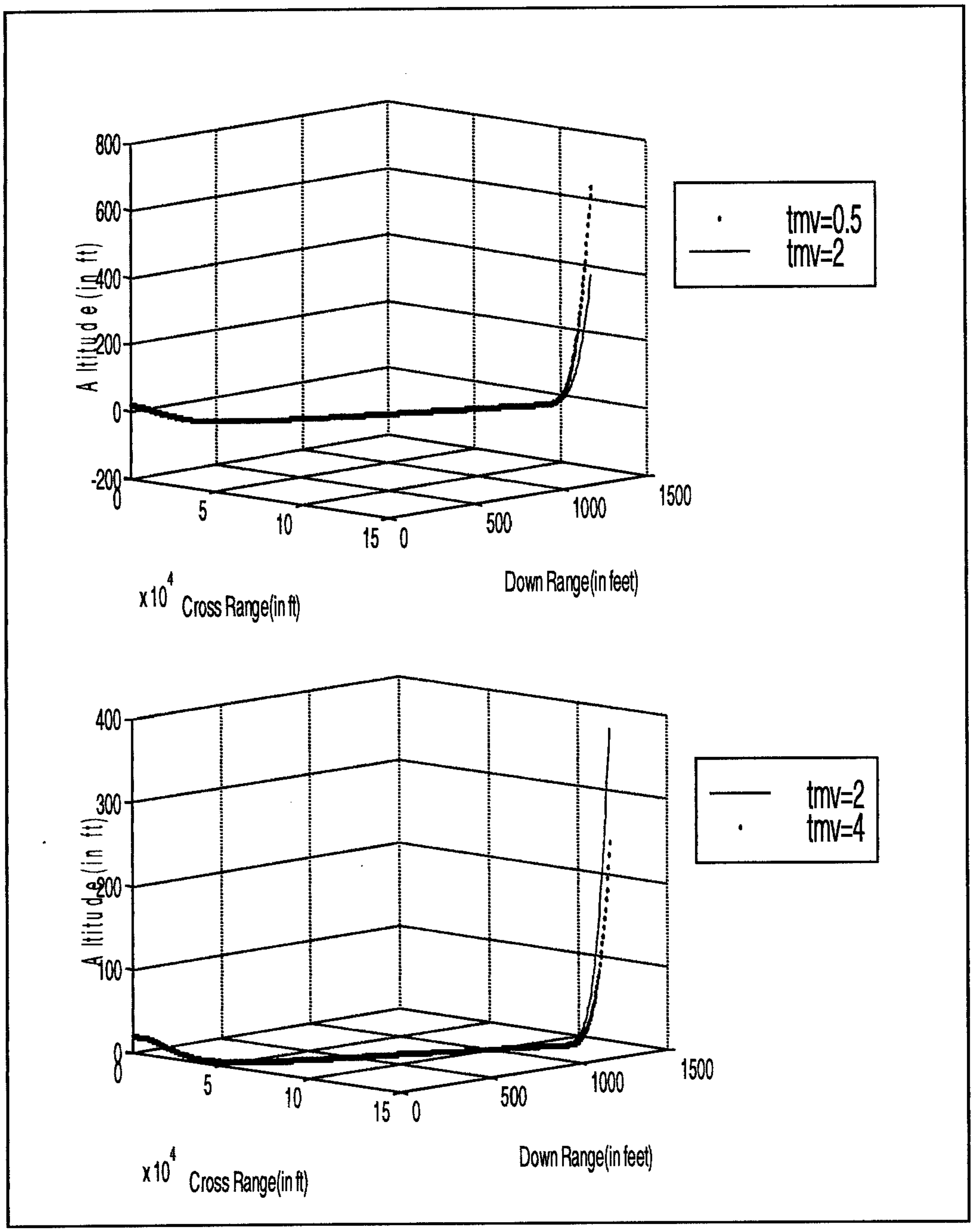


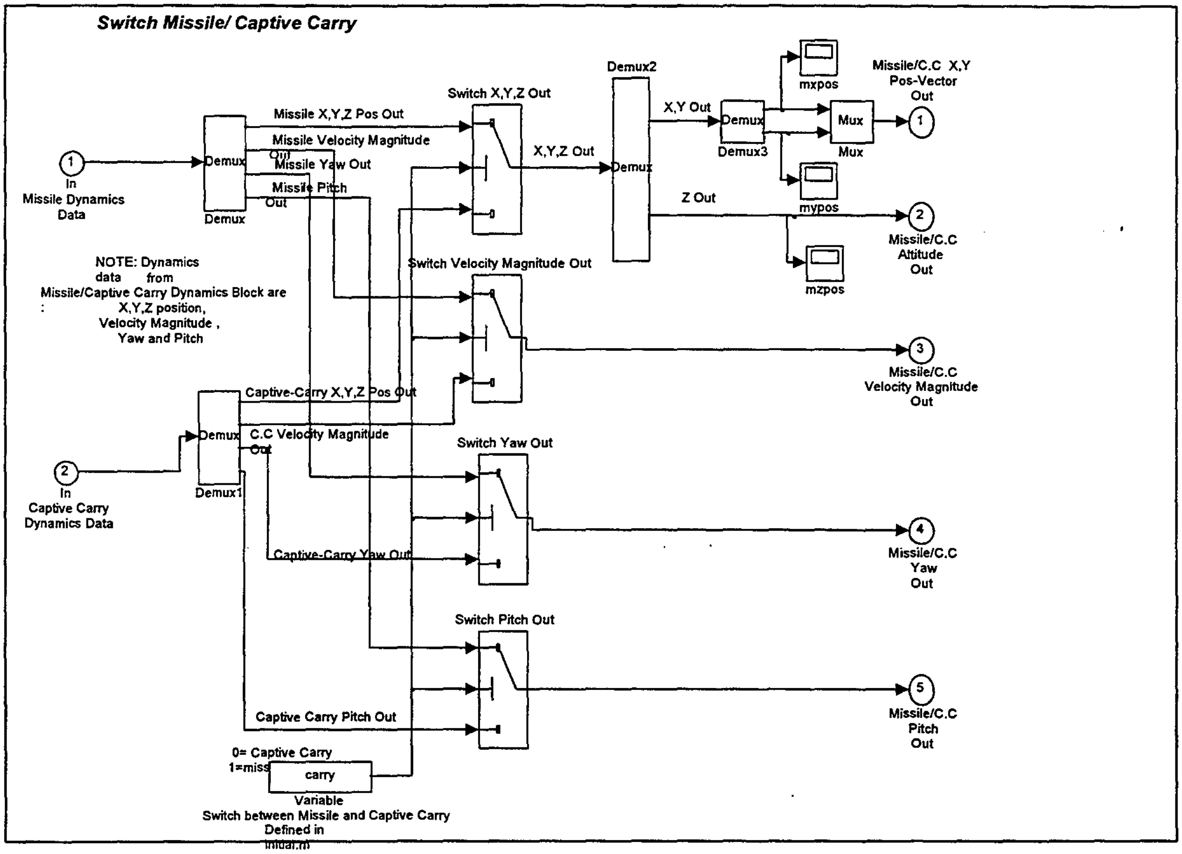
Figure 2.34. Missile Trajectory Effects due to *tmv* Variation

b. Switch Missile/Captive-Carry

The Switch Missile/Captive-Carry block is shown in Figure 2.35. This block selects what threat configuration (missile or captive-carry) is available to the ASCM Digital model block. The dynamics data input are the threat position, the velocity magnitude of the platform and the yaw and pitch angles assumed by the platform during its trajectory toward the target.

The input missile or captive-carry dynamics is switched by a threshold (***carry***) that is defined in the initialization code *intial.m*. If the value of ***carry*** is one, the selected threat is the missile. If the ***carry*** value is zero, the simulation is run with the captive-carry configuration.

The transmission of dynamics data to the Missile/Captive-Carry Dynamics block is straightforward for the threat velocity magnitude, yaw and pitch information. The threat position information is decomposed in the X-Y and Z position components to fit the format required by the Missile/Captive-Carry Dynamics and ASCM Digital Model blocks. Before sending the X-Y threat position, it is decomposed again in order to allow this block to send the selected threat position components to the MATLAB workspace using the Simulink© scopes ***mxpos***, ***mypos*** and ***mzpos*** that generate variables with the same name in the workspace.



SUMMARY:

BLOCK: Switch Missile/Captive-Carry

SUB-BLOCK(s): None.

INPUT(s): Missile dynamic data (position, velocity magnitude, yaw, and pitch) and Captive-Carry dynamic data (position, velocity magnitude, yaw, and pitch) from the block Missile / Captive-Carry Dynamics.
Switch ***carry*** allows selection between the dynamics outputs of the missile or the captive- carry.

OUTPUT(s): Selected threat (missile or captive-carry dynamic data -position, velocity magnitude, yaw, and pitch).

AVAILABLE FUNCTION(s): None.

Figure 2.35. Switch Missile/Captive-Carry Dynamics Block

4. Time_to_Go (TTG) and Miss_Distance

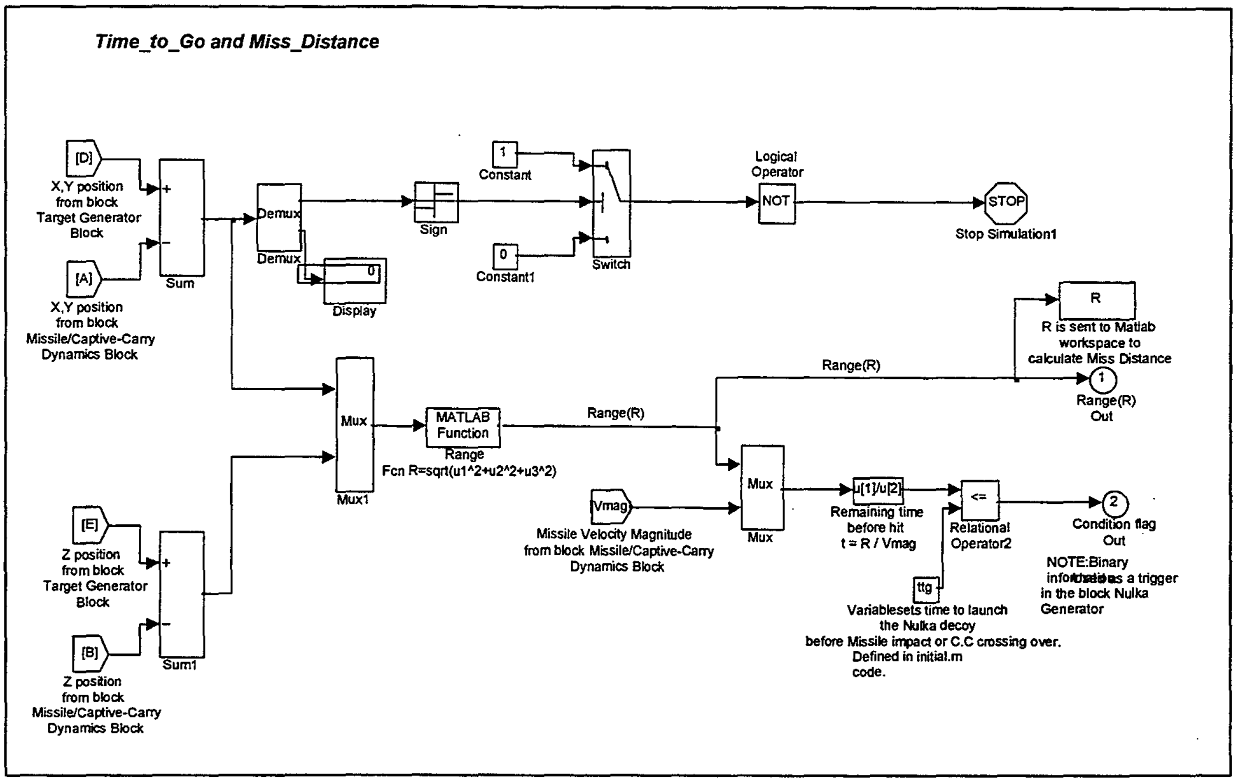
The Time_to_Go (TTG) and Miss_Distance block is shown in Figure 2.36 and performs several important tasks during a simulation. The most important is to stop the simulation when the missile hits the target or the captive-carry aircraft crosses over the target. The other tasks are to calculate the distance between the threat and target, and to send this information to the MATLAB© workspace for the miss distance calculation, and to also generate an internal parameter that warns when the time-to-go is equal to or less than the pre-set value defined in the *initial.m* code through the variable ***ttg***.

The TTG and Miss_Distance block receives as inputs the X-Y and Z coordinates of the threat and the threat velocity magnitude from the Missile/Captive-Carry Dynamics block, and the selected target from the Target Generator block. The threat and target positions are received in the X-Y and Z position channels (horizontal and vertical channels, respectively). In both channels, the missile position is always subtracted from the target position because the former is smaller than the later in the horizontal plane and thus generates initially a positive position difference in the horizontal channel and a negative position difference in the vertical channel.

The horizontal position difference takes two different paths. In the first path, the horizontal position difference is separated in its X and Y components. The X position difference is introduced to the Simulink© block *sign* to detect when the X position difference becomes negative thus signifying that the target was already hit or the captive-carry aircraft is crossing over. This signal variation of the X position difference is compared with a threshold, equal to zero (logical switch). Before the missile reaches the target, the X position difference is always positive which makes the *sign* block send a value of one to the logical switch. The logical switch compares that value with the threshold and allows the constant value of one in port one to be released to the logical port "NOT". The logical port "NOT" transforms the unity value in zero, which is sent to the Simulink *stop* block that permits the simulation to continue. When the missile hits or the captive-carry aircraft crosses over the target, the X position the difference has a negative value and the *sign* block sends a negative unity value to the logical switch that compares it with the threshold value and releases the zero value to port 3. The "NOT" function transforms the value from one to zero to stop the simulation. In the second path, the X-Y position differences are combined in a 2x1 vector with the Z position difference. The difference vector is introduced to a function that calculates the magnitude of the vector (range).

The range value also takes two paths. One goes to the section that sends its values to the MATLAB workspace through the variable ***R*** for further and precise miss distance calculation and also to the block ASCM/Captive-Carry model in order to display the approximate miss distance at the end of the simulation. The second path divides each ***R*** value by the threat velocity magnitude from the Missile/Captive-Carry Dynamics block and, to give the remaining time before the missile hits the target or the captive-carry aircraft crosses over the target. This value is compared with ***ttg*** by the relation operator and when its value is less than the time-to-go selected for the simulation, the relation operator sends a positive unity value to the ASCM/Captive-Carry model, which is called the internal parameter ***flag.***

The internal parameter ***flag*** in the ASCM/Captive-Carry model is used to mark the exact moment the target to launch the Nulka decoy. The Nulka Generator and the Switch target/Nulka blocks use the parameter ***flag***.


Time_to_Go and Miss_Distance
[D]
X,Y position from block Target Generator Block
[A]
X,Y position from block Missile/Captive-Carry Dynamics Block
Sum
Demux
Demux
Display
Sign
1
Constant
0
Constant1
Switch
Logical Operator
NOT
STOP
Stop Simulation1
R
R is sent to Matlab workspace to calculate Miss Distance
Range(R)
1
Range(R) Out
Mux
Mux1
MATLAB Function
Range
Fcn R=sqrt(u1^2+u2^2+u3^2)
Range(R)
Vmag
Missile Velocity Magnitude from block Missile/Captive-Carry Dynamics Block
Mux
Mux
u[1]/u[2]
Remaining time before hit t = R / Vmag
<=
Relational Operator2
2
Condition flag Out
NOTE:Binary info[illegible] a trigger in the block Nulka Generator
ttg
Variablesets time to launch the Nulka decoy before Missile impact or C.C crossing over. Defined in initial.m code.
[E]
Z position from block Target Generator Block
[B]
Z position from block Missile/Captive-Carry Dynamics Block
Sum1

SUMMARY:

BLOCK: Time_to_Go and Miss_Distance

SUB-BLOCK(s): None.

INPUT(s): Selected target position
Selected threat position and
Threat velocity magnitude

OUTPUT(s): Signal **stop** that stops the simulation,
Variable ***R*** (range) sends information to the Matlab
Internal parameter ***flag***

AVAILABLE FUNCTION(s): None.

Figure 2.36. Time_to_Go (TTG) and Miss_Distance Block

III. GENERAL TARGET MODEL

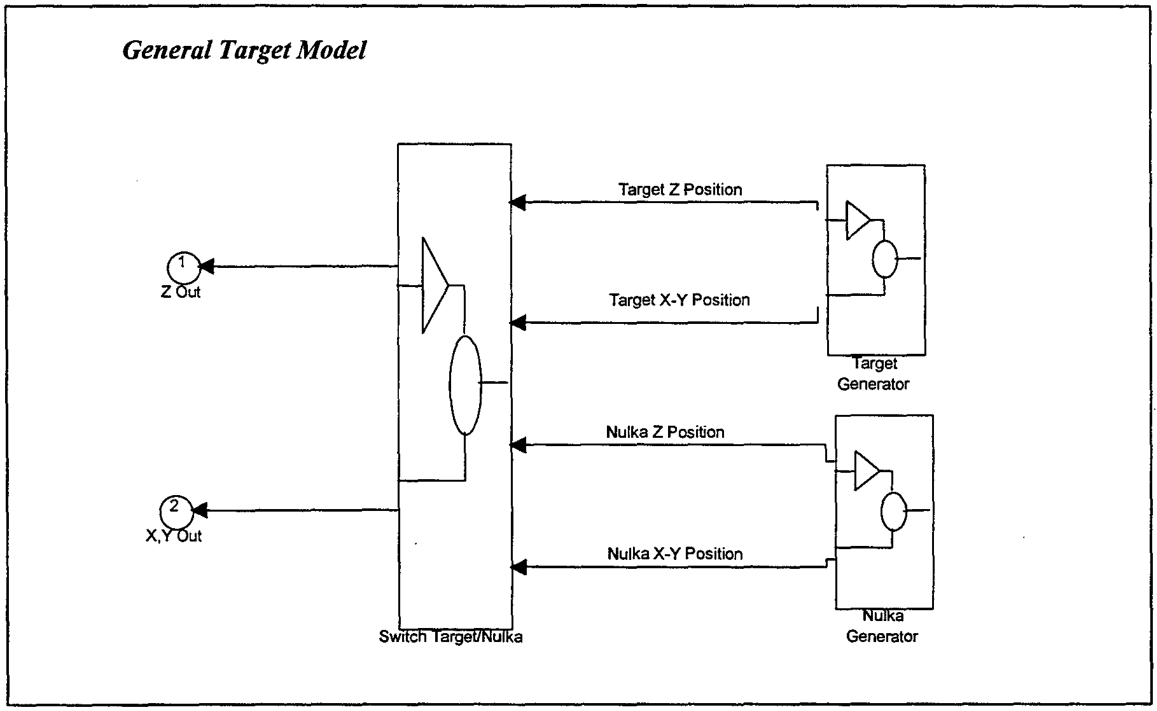
The General Target Model in Figure 3.1 is the block responsible for generating the target that is projected to the threat seeker. In the ASCM Digital Model, there are three types of targets. The first two targets represent a surface combatant. They are called Original Target and Ship. The last one is a Nulka decoy launched from one of the two surface combatants. The two surface combatants are generated in the Target Generator sub-block shown in Figure 3.2. The Nulka decoy is generated in the Nulka Generator block shown in Figure 3.3.

The General Target model block also has the sub-block Switch Target/Nulka shown in Figure 3.4. It has the ability to receive the selected target (Original Target or Ship) and the Nulka positions and to select the one to be projected to the threat seeker in the ASCM Digital Model. The parameter used for this decision is a function of the internal parameter ***flag*** generated in the TTG and Miss_Distance block.

A. TARGET GENERATOR

The Original Target and Ship sub-sub-blocks within the Target Generator sub-block are used to generate the type of target desired for the simulation. This decision is a function of the variable ***swtsh***, defined in the initialization code before running a simulation. In order to avoid confusion, the Original Target will be called the first configuration and the Ship Target will be called the second configuration.

The first configuration is a ship in course 000° (assuming the Y axis as the true North) at a speed of 12 knots at a distance 120,000 feet from the inertial origin. This first configuration is called Original Target because it was the first target developed for the



SUMMARY:

BLOCK: General Target Model

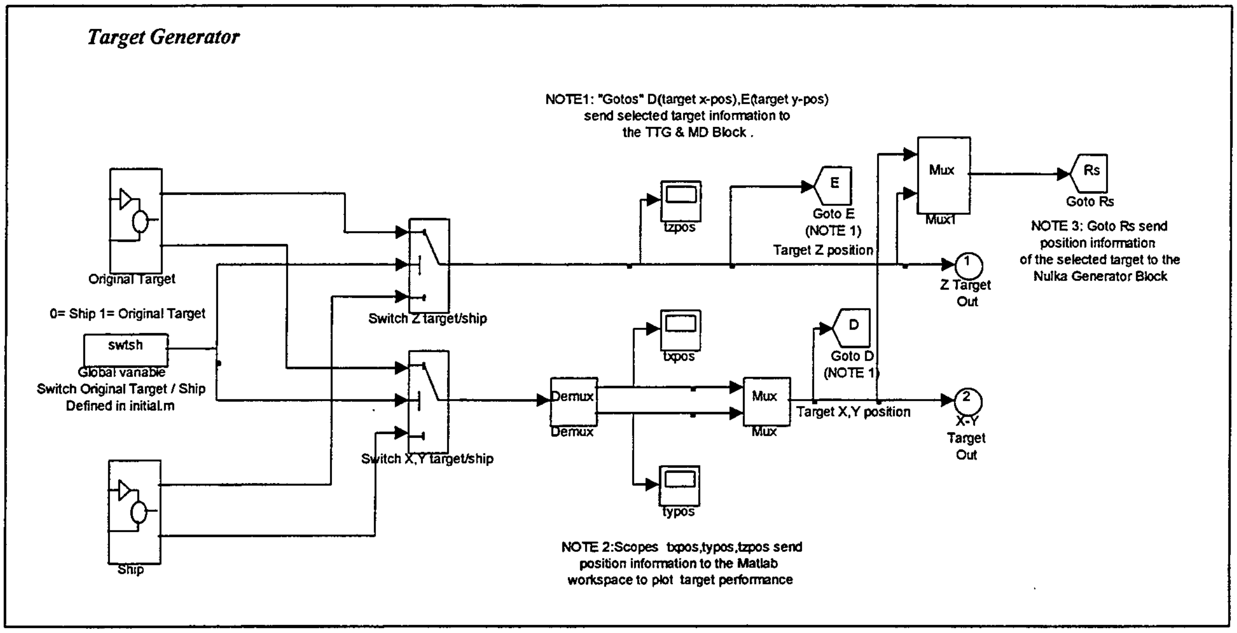
SUB-BLOCK(s): Target Generator
Nulka Generator
Switch Target/Nulka

INPUT(s): None.

OUTPUT(s): Selected threat position to the ASCM Digital Model.

AVAILABLE FUNCTION(s): None.

Figure 3.1. General Target Model


Target Generator

NOTE1: "Gotos" D(target x-pos),E(target y-pos) send selected target information to the TTG & MD Block .

NOTE 3: Goto Rs send position information of the selected target to the Nulka Generator Block

NOTE 2:Scopes txpos,typos,tzpos send position information to the Matlab workspace to plot target performance

SUMMARY :

BLOCK: Target Generator

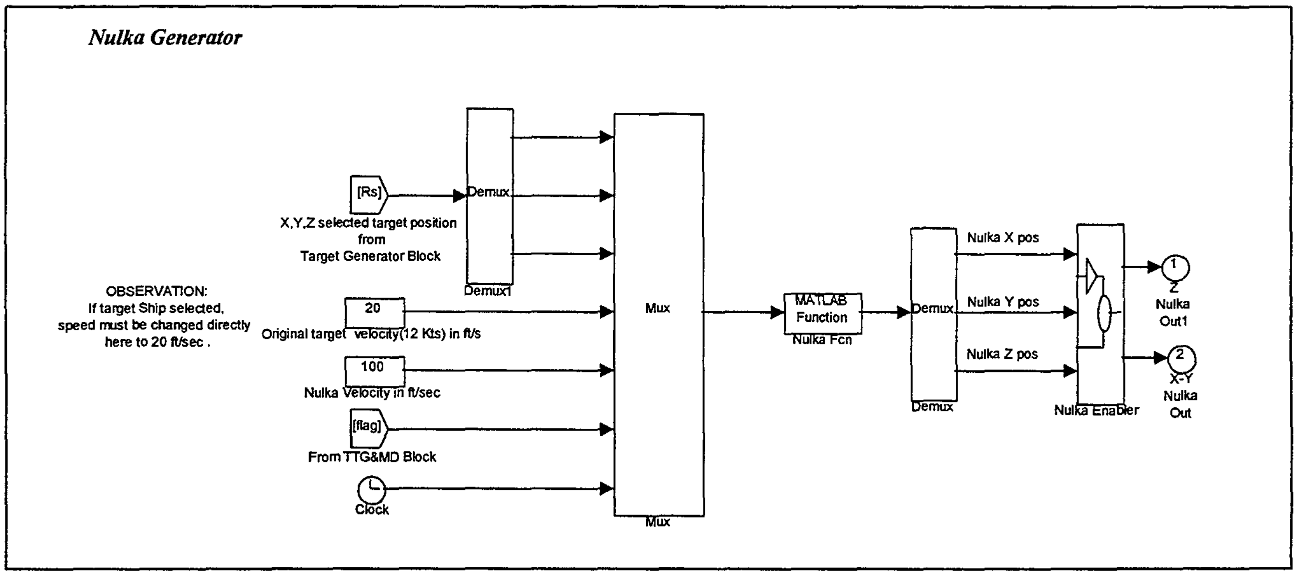
SUB-BLOCK(s): Original Target
Ship

INPUT(s): swtsh (switch-to-ship) –general switch that allows selection between the the Original Target (heading 000° at 12 knots) or Ship (heading 000° at 10 knots).

OUTPUT(s): Three Simulink© GOTOs are used to send information to other blocks:
GOTOs **D** and **E** send the selected target position to the "Time_to_Go and Miss_Distance" block.
GOTO ***Rs*** send position information to the Nulka Generator block.
Also, the selected target information is sent to the General Target Model.

AVAILABLE FUNCTION(s): None.

Figure 3.2. Target Generator Sub-Block



SUMMARY:

BLOCK: Nulka Generator

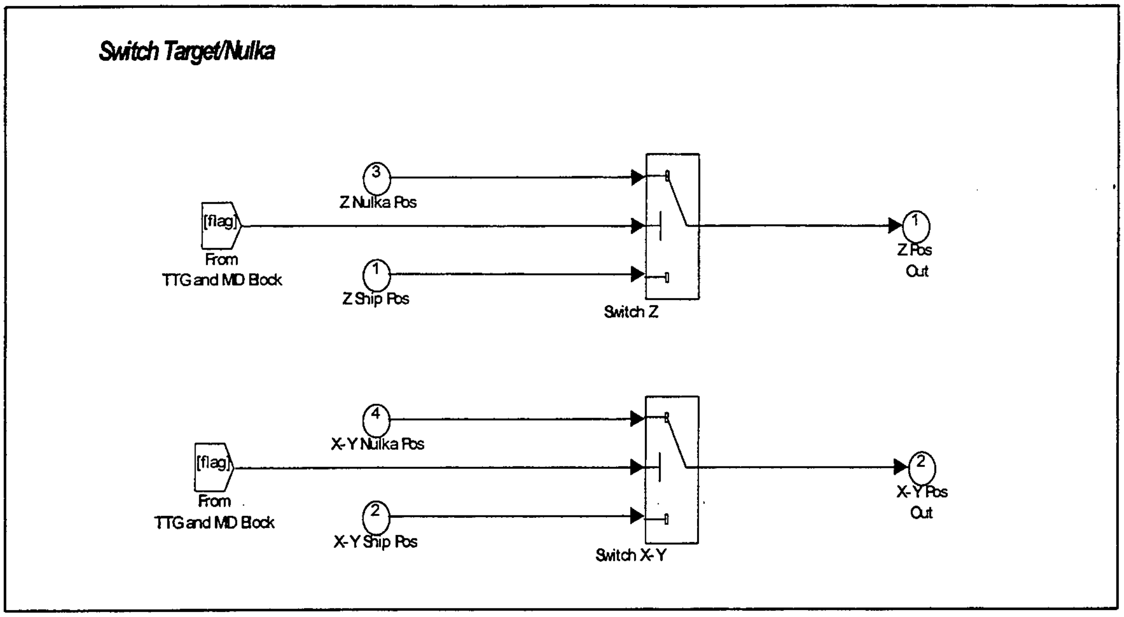
SUB-BLOCK(s): Nulka Enabler

INPUT(s): FROM ***Rs*** (selected target position from Target Generator block),
Ship velocity 20 ft/sec or (50/3) ft/sec,
Nulka velocity,
FROM ***f lag*** internal parameter, received from the block Time_to_Go and Miss_Distance,
Current simulation time

OUTPUT(s): Nulka position to the General Target Generator block.

AVAILABLE FUNCTION(s): *nulka.m* (See Appendix D).

Figure 3.3. Nulka Generator Sub-Block



SUMMARY:

BLOCK: Switch Target/Nulka

SUB-BLOCK(s): None.

INPUT(s): Selected target position
Nulka position
Internal parameter ***flag*** from the TTG and Miss_Distance block

OUTPUT(s): The general target position to the ASCM Digital Model.

AVAILABLE FUNCTION(s): None.

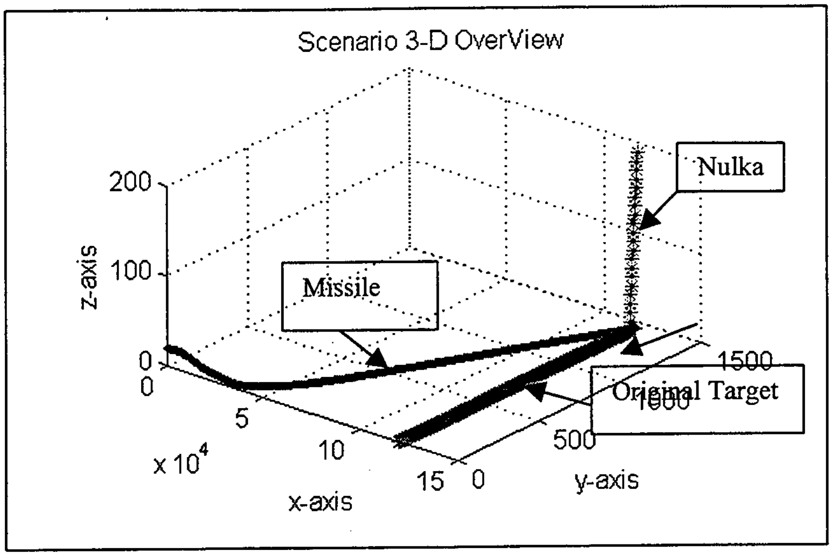
Figure 3.4. Switch Target/Nulka Sub-Block

ASCM Digital model before improvements were made. The simulations run for this thesis all were assumed to have the Original Target as the primary target due to its tactical position with respect to the incoming missile.

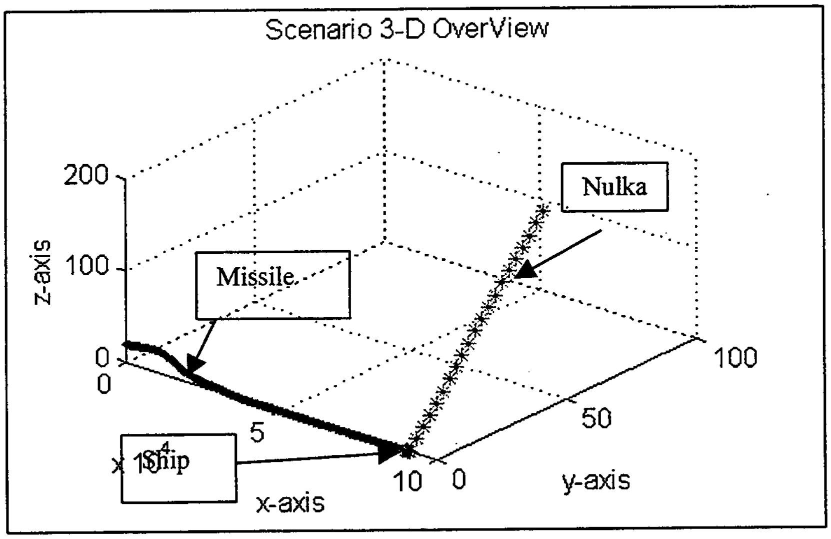
The second configuration is a target moving in the X direction on a course 090° at a speed of 10 knots, at a distance of 90,000 feet from the inertial origin. It was implemented in order to offer the user an option to observe what the threat seeker responses are for these two types of targets. Figure 3.5 presents the two target profiles available.

The Target Generator sub-block in Figure 3.2 generates the X, Y and Z coordinates of the two types of target configurations (Original Target and Ship), and introduces them to two switches, one for the Z coordinate and the other for the X-Y coordinates. These switches have the threshold values equal to one and, depending on the variable ***swtsh*** value, (***swtsh***=1 for the Original Target and ***swtsh***=0 for Ship) they allow the Original Target or Ship coordinates to pass to the Switch Target/Nulka sub-block. After one target is selected, which in our case is always the Original Target, its position is sent by the scopes ***txpos***, ***typos*** and ***tzpos*** to the MATLAB© workspace to be stored in the structure ***store*** and also to be used for simulation graphing as necessary.

There are two Simulink© GOTOs that send the selected target position to the TTG & MD block shown in Figure 3.2 in order to give that block the necessary target information to stop the simulation when the threat hits or crosses over the target on the sea surface. The selected target position is also important to the Nulka Generator block



(a)



(b)

Figure 3.5. Target Profiles Available in the ASCM Digital Model: (a) Original Target and (b) Ship

in order to give an initial position to the Nulka rocket before launching. The GOTO ***Rs*** sends that information to the Nulka generator block.

1. Original Target Generator

The model presented in Figure 3.6 shows three distinct sources that generate the Original Target X, Y and Z coordinates. The Simulink© block that generates the Z coordinate to the Target Generator block sends constant values of zero which means that the target has no altitude. The X coordinate is also generated for a block that always sends a constant value for the target X coordinate equal to 120,000 feet (or 36.6 km) from the inertial origin. Finally, the Y coordinate is generated by a Simulink© *ramp* function whose slope is given as a function of the target velocity. For a target at 12 knots, the slope corresponds to 20 ft/sec. The resultant course is 000°. The X and Y coordinates are combined together by a Simulink© multiplexer block to be sent in a 2x1 vector format plus the Z coordinate to the Target Generator block.

2. Ship Generator

The Ship Generator block in Figure 3.7 has the same configuration as the Original Target except that the ramp function generates the target position in the X direction with a slope of (50/3) ft/sec which represents a target at a speed of 10 knots. The Y and Z directions are set to zero causing no displacement in those directions. The resultant course is 090°.

B. NULKA GENERATOR

The Nulka Generator block shown in Figure 3.3 and is the model of an active expendable decoy system developed for ships to face multiple threats in short reaction times encountered in several operational areas, but particularly in littoral waters.

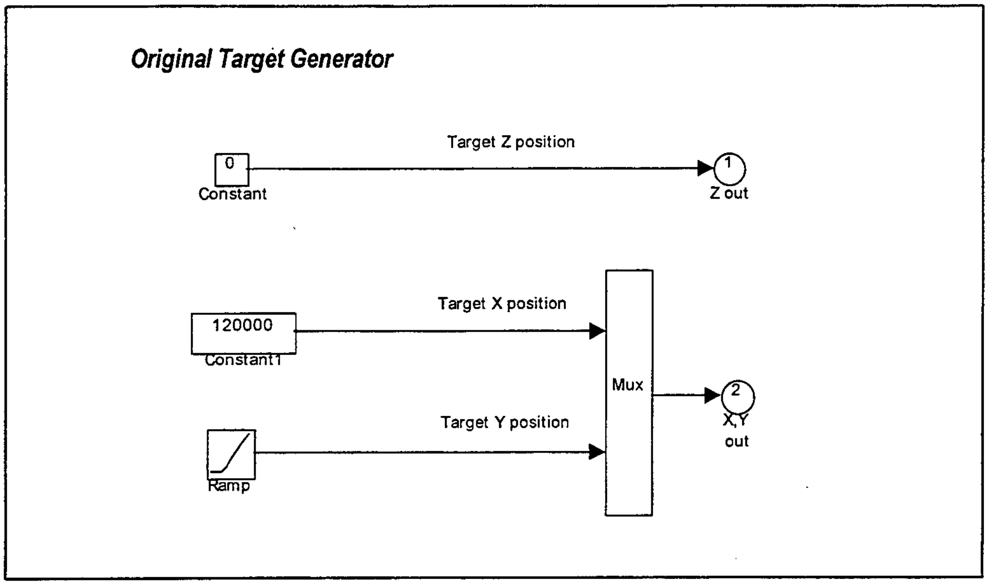


Figure 3.6. Original Target Generator Model

The system is composed basically for a fire control system, a launcher and the decoy itself as shown in Figure 3.8. The decoy consists of a maneuvering rocket and a microwave transponder payload used to seduce the threat in its final approach to the ship. The Nulka system allows for setting the decoy flight path and speed. The Nulka system accounts for the ship's motion and the wind conditions. The Nulka rocket positions the transponder payload in the direction of the threat in order to maximize the decoy position for the missile seduction. The microwave payload generates sufficient effective radiated power (ERP) to seduce the missile by offering to the seeker a larger radar cross section than the ship radar cross section. Nulka, compared with chaff, has the advantage of being unaffected by the weather conditions and does not require any ship maneuvers. Also Nulka can afford 360° of azimuth coverage.

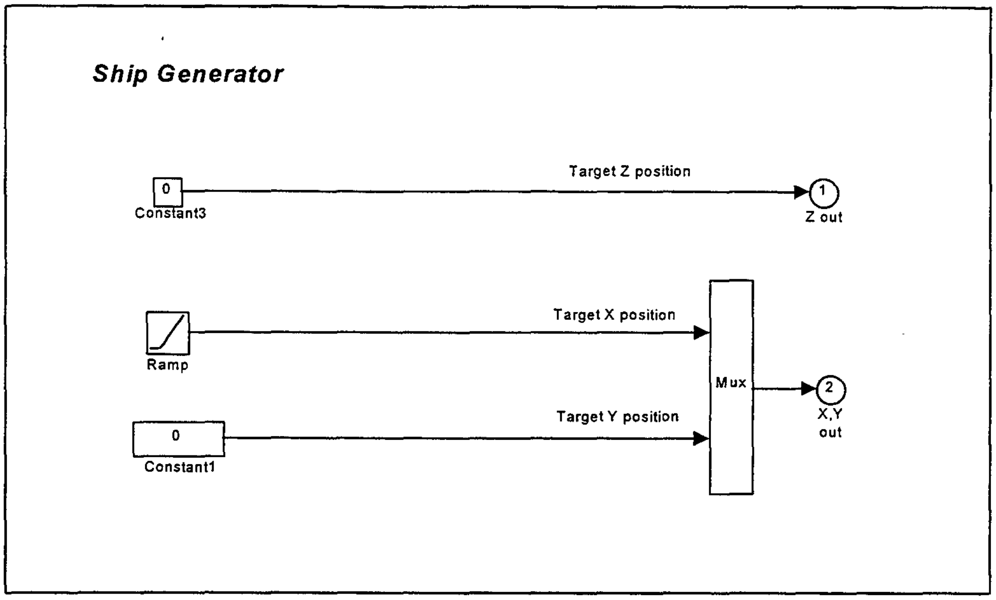


Figure 3.7. Ship Generator Model

In our model the path was set to be 45° from the horizontal plane and the speed was set to 100 ft/sec. The Nulka is launched perpendicular to the ship port side since the model's missile threats always approach by the port side. In our ASCM Digital model, the Nulka decoy always seduces the threat seeker.

1. Description

The Nulka Generator block shown in Figure 3.3 basically has as inputs the selected target (ship) position from the Target Generator Block, the target velocity, the Nulka speed which is assumed to be 100 ft/sec in this model, the Simulink© from*FROM* called ***flag*** (internal parameter, function of ***ttg***) and the time of simulation. The target velocity shown in Figure 3.3 has a constant value of 20 ft/sec that must be changed directly in the model for the value of 16.67 ft/sec if the Ship is the target selected. The time-to-go is the remaining time before the threat hits or crosses over the target depending on the type of simulation selected, and basically it defines how much time the target has to launch the Nulka decoy to seduce the threat seeker. All those inputs are composed in a vector and introduced as inputs for the function *nulka.m* in Appendix D. This program calculates the Nulka position from the beginning of the simulation. It also calculates the exact moment of the Nulka launch as a function of the time-to-go and, after the launch, keeps it in a position relative to the selected target until the end of the simulation.

The *nulka.m* code in Appendix D calculates the Nulka position. After calculating the position, the *nulka.m* code sends that information back to the Nulka Generator block where it is decomposed into the X, Y, Z coordinates and introduced into the Nulka Enabler block shown in Figure 3.9. The Nulka Enabler block sends the Nulka position (or not) to the General Target model depending on the value of the variable ***nlk.***

2. *Nulka.m* code

The *nulka.m* code was created to provide the Nulka position calculation from the beginning of the simulation. Initially, the Nulka position coincides with the selected target (ship) position. The launching instant is dependent on the value of **ttg** (time-to-go). When the remaining time before the threat hits or crosses over the target equals the ***ttg*** value set in the *initial.m* code, the Nulka decoy is launched. The Nulka decoy is launched 45° above the sea surface. Its maximum altitude is set to be 400 feet and the Nulka must keep the relative position in relation to the target constant (port side in our case).

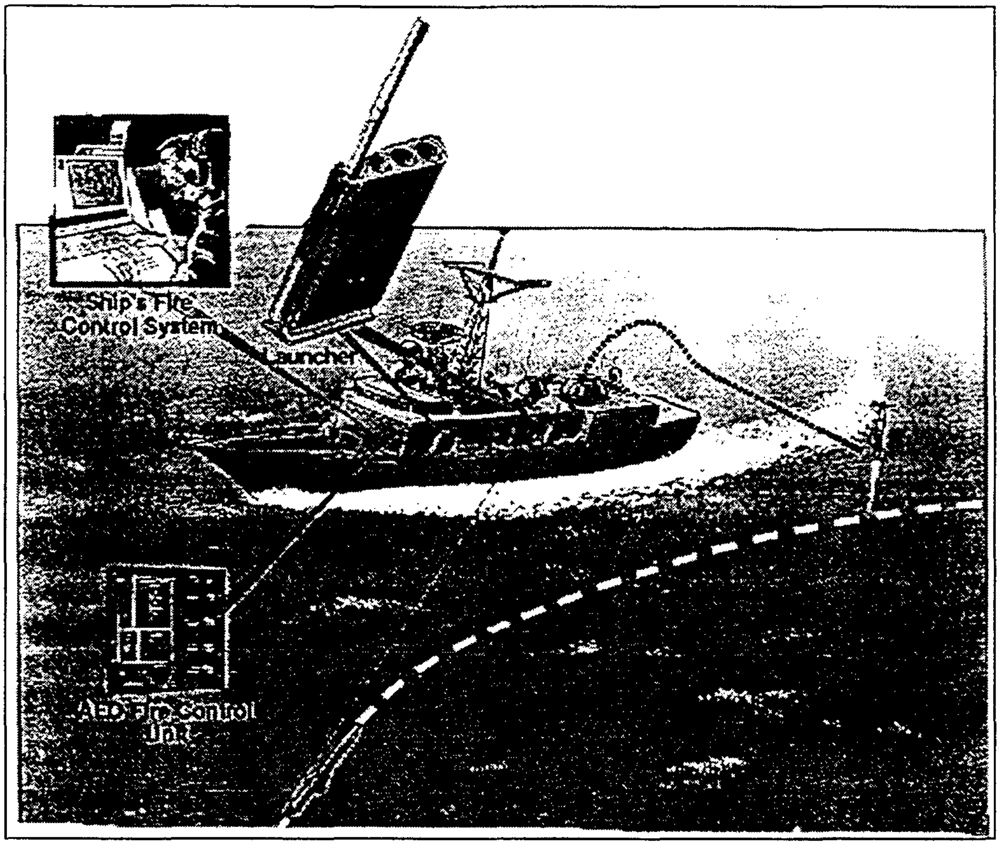


Figure 3.8. Nulka System Components (After [Ref. 8])

The *initial.m* (Appendix B) code starts calling the global variable ***po*** that was initialized in the *initial.m* code. The ***po*** variable is composed of five elements: the trigger time, the Nulka X, Y and Z position, and the launching time. In the *initial.m* code, all the ***po*** elements are equal to zero. When the simulation starts, the current selected target position is sent to the *nulka.m* (Appendix D) function that generates outputs with the same values indicating that, in the beginning of the simulation, the Nulka decoy is onboard. Besides the selected target position, the function also receives the ship velocity, which is 20 ft/sec in this thesis, the Nulka speed (100 ft/sec), the current value of the internal parameter ***flag*** sent by the TTG and Miss Distance block (whose initial value is zero, and it changes to one when ***ttg*** is reached) and, finally, the current simulation time.

During the simulation, the function continuously verifies if the value of ***flag*** has changed. If the answer is negative, the function output is the current selected target position. If the answer is positive, the trigger time is checked to see if it was already used. If not used, the function re-assigns the current target position and the current simulation time from the second to the fifth elements of ***po***. The first ***po*** element has its value changed to one, which indicates that the trigger time was used. The trigger time ensures that the Nulka decoy is launched only once during a simulation.

For position updating, the function calculates the time difference between the current simulation time and the value stored in ***po*** (5). The latter stores the simulation time when ***ttg*** is reached. The time difference, multiplied by the target velocity, generates the increments in the X, Y and Z directions. For the X direction increment, the time difference is multiplied by the target velocity and added to the Nulka initial position stored in ***po*** (2). For the Y-Z coordinates, the Nulka speed is decomposed in its Y and Z components, multiplied by the time difference and added to the Nulka initial Y (***po*** (3)) and Z (***po*** (4)) positions. These updated Nulka positions are the function output until the fixed operation altitude (400-ft) is reached. When this altitude is reached, only the X and the Y positions are updated until the end of the simulation.

3. Nulka Enabler

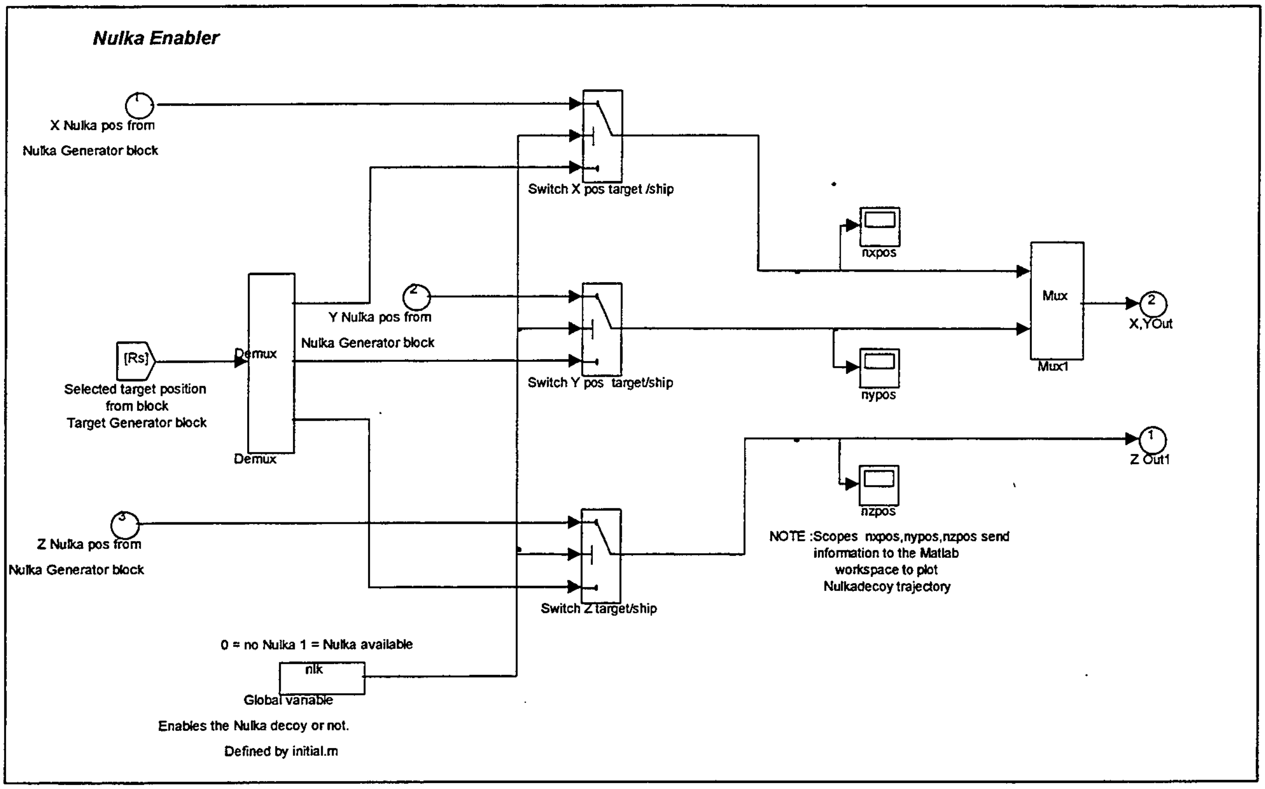
The Nulka Enabler block shown in Figure 3.9 has the function of allowing the presence of the Nulka decoy in the simulation or not. The key variable for this decision is ***nlk***. If the ***nlk*** value is set to one by the *initial.m* code, the simulation has the Nulka present. On the other hand, if the ***nlk*** value is equal to zero, the Nulka is not available in the simulation.

The Nulka Enabler receives the Nulka position from the *nulka.m* function as inputs and the selected target position information from the Target Generator block. The Nulka and target X, Y and Z positions are introduced to three switches: one for each coordinate. The threshold value for those switches is unity. The ***nlk*** value is compared with the threshold values. If ***nlk*** is one, it releases the Nulka position. If the ***nlk*** is zero, it releases the target (ship) position. The position released by the three switches is sent to the MATLAB© workspace by the Simulink© scopes ***nxpos***, ***nypos*** and ***nzpos***. It is evident that if the selected target information is the block output, the general effect on the simulation is no Nulka available.

C. SWITCH TARGET/NULKA

After the target position (calculated by the Target Generator) and the Nulka position (calculated by the Nulka Generator)are obtained, the positions are projected to the Switch Target/Nulka block (Figure 3.10). The basic purpose of this block is to define the exact moment when the Nulka position must start entering in the threat seeker FOV (a function of the ***ttg*** selected for that simulation).

The internal block structure simply consists of two channels: one for the Z coordinate and the other for the X-Y coordinates. The Nulka and target coordinates are sent from the General Target block and introduced to two switches. The channel switches have unity values as threshold. The value of the internal parameter ***flag*** is generated by the TTG and MD block, where initially its value is equal to zero. However,



NOTE :Scopes nxpos,nypos,nzpos send information to the Matlab workspace to plot Nulkadecoy trajectory

SUMMARY:

BLOCK: Nulka Enabler

SUB-BLOCK(s): None.

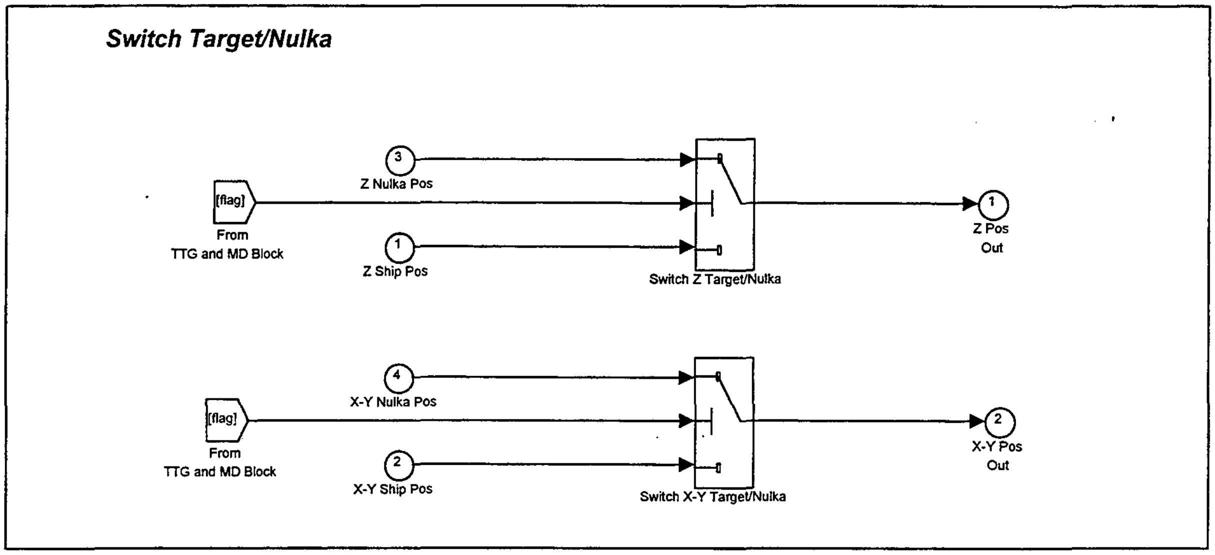
INPUT(s): Nulka X, Y and Z position calculated by function *nulka.m*,
***Rs*,** selected target position,
nlk – general switch that allows the presence of the Nulka decoy in the Simulation.

OUTPUT(s): Nulka position

AVAILABLE FUNCTION(s): None.

Figure 3.9. Nulka Enabler Model

when the remaining time before the threat hits or crosses over the target equals the ***ttg,*** ***flag*** changes its value to one, which is equal to the threshold value for the channel switches. The Nulka is released as the target position to be offered to the threat seeker in the ASCM Digital model.



SUMMARY:

BLOCK: Switch Target / Nulka

SUB-BLOCK(s): None.

INPUT(s): Selected target X, Y, and Z position from General Target Model, Nulka X, Y, and Z position from General Target Model, internal parameter ***flag***. Depending on the value of ***flag***, it allows the position of the selected target -ship/original target (***flag*** =0) or the Nulka position from the Nulka Generator block (***flag*** =1) to be projected to the General Target Generator.

OUTPUT(s): General target (Nulka or selected target) X, Y, and Z position to the ASCM Digital Model.

AVAILABLE FUNCTION(s): None.

Figure 3.10. Switch Target/Nulka

IV. INITIALIZATION OF THE MODEL PARAMETERS (INITIAL.M CODE)

To be able to use the ASCM Digital model it is necessary to set initial values for the model parameters. Those variables and their default values are presented in Table 4.1. The MATLAB® *initial.m* code, shown in Appendix B, initializes the default parameters but also executes other important tasks in order to run a large number of simulations.

The default settings of this model represent a specific tactical situation. It is configured to have a target (variable ***swtsh*** equals to one, Original Target) heading 000° (North) at the speed of 12 knots. The target has a decoy called Nulka (variable ***nlk*** equals to one) launched as a function of the time-to-go (***ttg***). This target is defending itself from a sea-skimming missile (***carry*** equals to one) that has a COSRO seeker (variable ***seltrac*** equals to one) and a Gaussian beam shape (variable ***beam*** equal to one). There is no noise present in the seeker (variable ***noise*** equals zero).

The missile is divided in several sub-systems such as Tracking Seeker, Autopilot and Missile Dynamics. For each sub-system, there are associated variables responsible for the sub-system initializations. For the seeker, there is ***ska1*** (azimuth forward gain), ***ska2*** (azimuth feedback gain), ***skv1*** (vertical forward gain), ***skv2*** (vertical feedback gain), ***sekhlim*** (seeker horizontal limit) and ***sekvlim*** (seeker vertical limit).

Parameter	Default Value	Variable name
Seeker: Azimuth Forward Gain	0.25	***ska1***
Seeker: Azimuth Feedback Gain	0.25	***ska2***
Seeker: Elevation Forward Gain	0.25	***skv1***
Seeker: Elevation Feedback Gain	0.25	***skv2***
Seeker: FOV Horizontal Limit	0.2618	***sekhlim***
Seeker: FOV Horizontal Limit	0.2618	***sekvlim***
Seeker :Tracker Type 0=*COSRO* 1=*Monopulse*	0	***seltrac***
Seeker: Beam Shape 0=*Gaussian* 1=*Sinc Function*	1	***beam***
Proportional Navigation: Azimuth	4	***enra***
Proportional Navigation: Elevation	4	***enrb***
AutoPilot: Azimuth Forward Gain (Horizontal)	0.5	***ta1***
AutoPilot: Azimuth Feedback Gain (Vertical)	0.5	***ta2***
AutoPilot: Azimuth Forward Gain (Horizontal)	0.5	***tb1***
AutoPilot: Azimuth Feedback Gain (Vertical)	0.5	***tb2***
Missile Dynamics: XY Acceleration Delay	2	***tm***
Missile Dynamics: Z Acceleration Delay	2	***tmv***
Missile Dynamics: Velocity Delay	0.5	***tv***
Time-to-go	8	***ttg***
Target Selection 0=*Ship* 1=*Original Target*	1	***swtsh***
Threat Selection 0=*Captive-Carry* 1=*Missile*	1	***carry***
Nulka Enabler 0=*No Nulka* 1-*Nulka on*	1	***nlk***
Noise Enabler 0=*No noise* 1=*Noise present*	0	***noise***

Table 4.1. ASCM Digital Model Default Parameters

The Effective Navigation Ratio is not a sub-system but it introduces a gain to the L.O.S. (line-of-sight) rate from the Tracking Seeker Dynamics block in both the horizontal and vertical channels of the Autopilot. The gain values are set by the variables ***enra*** and ***enrb***. The Autopilot has the variable ***ta1*** (azimuth forward gain), ***ta2*** (azimuth feedback gain), ***tb1*** (vertical forward gain) and ***tb2*** (vertical feedback gain). For the Missile Dynamics the variables responsible for the missile initialization are ***tm*** (XY Acceleration Delay), ***tmv*** (Z Acceleration Delay) and ***tv*** (Velocity Delay). Finally, the remaining two variables are ***ttg*** and ***chaff***. The variable ***chaff*** *is* not associated with any sub-system or special target countermeasure. It was put in the initialization code and in the Graphical User Interface (GUI) *Menu* to prepare this model for further improvements. The variable ***ttg*** (time-to go) defines the exact moment when the Nulka decoy is launched in order to seduce the threat seeker. This seduction makes the missile break-lock which gives a miss distance or effectiveness measurement.

The *initial.m* code defines initially two global variables, ***po*** and ***I***. The variable **po** is a 1x5 matrix responsible for launching the Nulka rocket after the time-to-go set for the simulation being reached. Each element in the matrix has information that will be used for the nulka.m code shown in Appendix D and the Nulka Generator block in the ASCM Digital Model.

The global variable ***I*** is a structure responsible for storing all the initialization model parameters. The fields of the structure are presented in Appendix B, but are also introduced here. The initialization parameters were divided into four major groups: General Switches, the ASCM Digital Model, the COSRO Seeker and the monopulse Seeker. The General Switches group is responsible for setting the tactical environment where the simulation is to happen, i.e., the number of the simulation (variable ***num*** indexes all the other parameters), if the target is the Original Target or Ship (variable ***swtsh***), if the threat is a missile or a captive-carry (variable **carry**), if the Nulka decoy is enabled or not (variable ***nlk***), if the threat seeker has noise in it or not (variable ***noise***), and what type of seeker is available for the simulation (variable ***seltrac***). The variables ***ska1***, ***ska2***, ***skv1***, ***skv2***, ***enra***, ***enrb***, ***ta1***, ***ta2***, ***tb1***, ***tb2***, ***tm***, ***tmv***, ***tv***, ***ttg***, ***sekhlim*** and ***sekvlim*** compose the second group or the ASCM Digital Model. These variables set up the initial values of the ASCM Model.

The seeker initialization parameters are very similar in their purpose as they set the values for the type of seeker selected by ***seltrac*** (COSRO or monopulse). The parameters for the COSRO seekers are: ppc (peak power, in kW), ***freqc*** (frequency, in GHz), ***antgainc*** (antenna gain, in dB), ***HPc*** (half power beamwidth, degrees), ***noibwc*** (noise bandwidth, in MHz), ***noifigc*** (noise figure, in dB), ***rrc*** (Range resolution, in meters), ***numpulc*** (number of pulses integrated), ***nosangc*** (normalized offset angle), ***envc*** (envelope correlation time, in seconds), ***nutfreqc*** (nutation frequency, in Hertz), ***serbwc*** (servo bandwidth, in Hertz), ***crossc*** (target radar cross subsection, in square meters), ***alphac*** (one-way atmospheric attenuation, in dB/km) and ***beam*** (which selects the beam shape for the COSRO seeker, Gaussian or Sinc function).

The parameters of the monopulse seeker are: ***ppm*** (peak power, in kW), ***freqm*** (frequency, in GHz), ***antgainm*** (antenna gain, in dB), ***HPm*** (half power beamwidth, degrees), ***noibwm*** (noise bandwidth, in MHz), ***noifigm*** (noise figure, in dB), ***rrm*** (Range resolution, in meters), ***numpulm*** (number of pulses integrated), ***fslrm*** (first side lobe ratio, in dB), ***crossm*** (target radar cross subsection, in square meters) and ***alpham*** (one-way atmospheric attenuation, in dB/km). These seeker parameters are fundamental to the noise calculation by the *noise_error.m* code shown in Appendix C. After defining ***po*** and ***I***, the *initial.m* code creates 49 cells to store the initialization values.

The next step is to assign the initial values for the number of simulations required. In this thesis, for instance, the number of simulations was set to 4,800 due to the missile performance analysis when changing the ASCM Digital Model parameters. However, that number depends on the purpose to be attained. The default values in this thesis for the ASCM Digital Model parameters are presented in Table 4.2 and may vary. The COSRO and monopulse initial values used for the noise calculation remain the same as in Chapter II.

General Switches values in the *initial.m* code are presented in Appendix B with the following assumptions: the values of ***num*** range from 1 to 2,400; all the simulations set by *initial.m* code are for the missile as a threat (***carry*** equals to one) to the Original Target (**swtsh** equals to one). The Original Target always has the Nulka decoy enabled (***nlk*** equals to one).

For noise calculation, there are four distinct groups of simulations depending on each variation of the parameters presented in Table 4.2. The first group of simulations assumes there is no noise. The second group assumes that there is noise and it affects a COSRO seeker with a Gaussian beam shape. The third group also assumes that there is noise and it affects a COSRO seeker with a sinc function beam shape. The fourth and last group also assumes there is noise and that it affects a Monopulse seeker. The COSRO and monopulse seeker parameters do not change during the simulations run in Chapter II.

Parameters	Range of Values
ska1*,*ska2*,*skv1* and *skv2	[0.1 ,0.25 (d)*, 1 , 4]
enra and enrb	[1 , 2 , 4 (d) , 8]
ta1,ta2,tb1,tb2 and tv	[0.25 , 0.5 (d) , 1 , 4]
tm and tmv	[0.5 , 1 , 2 (d) , 4]
sekhlim and sekvlim	[0.1309 , 0.2618 (d) , 0.3491 , 0.5236]
ttg	[2 , 4 , 6 , 8 (d) , 10 , 12 , 14 , 16 , 18 , 20]
* (d) = default value	

Table 4.2. ASCM Digital Model Initial Values Range

The ***I*** structure is formed by assigning the cells with the simulation data to the fields created to store them. The fields have the name of each variable presented before. After the fields receive the simulation data, the Graphical User Interface (GUI) *Menu* shown in Appendix E is called up and allows a user to select the simulation number and its associated variable values to initialize the ASCM Digital Model and to set the engagement conditions.

The following step is to assign the model default values that are in the first position of the structure ***I***. These default values are associated with the first simulation and are presented in Table 4.2.

Finally, a vector called ***current*** is defined that is used as input data to the Noise Generator block in the ASCM Digital Model. The ***current*** vector introduces the default values of the COSRO and Monopulse seeker parameters for the noise calculation using the function *noise_error.m* shown in Appendix C.

V. OPEN-LOOP CAPTIVE-CARRY MODEL

A. THE CAPTIVE-CARRY EXPERIMENTS

The purpose of this chapter is to discuss the open-loop captive-carry configuration of the model and compare the results with the closed-loop configuration. One example of a captive-carry aircraft used today by the Naval Research Lab (NRL) is a modified P-3 shown in Figure 5.1.

One of the major differences between the captive-carry configuration and the actual missile configuration is its speed. In our simulations, the missile speed is 1322 ft/sec while the captive-carry speed is 400 ft/sec. The speed differences generate two distinct time frames for an analysis of the results.

One other difference is that while the actual missile flies toward the target using the guidance signals from its seeker, the seeker signals in the captive-carry experiments are totally ignored by the captive-carry aircraft dynamics. Thus, it is possible to use the actual missile configuration to get the electronic attack (EA) effectiveness (miss distance, in our case) but it is more difficult for the captive-carry configuration. The results obtained from the captive-carry model configuration are the seeker range-to-target and the antenna azimuth and elevation angles.

B. CAPTIVE-CARRY MODEL

1. Captive-Carry Dynamics

The Captive-Carry Dynamics block is shown in Figure 5.2. This is part of the Missile/Captive-Carry Dynamics block shown in Figure 2.2 and generates

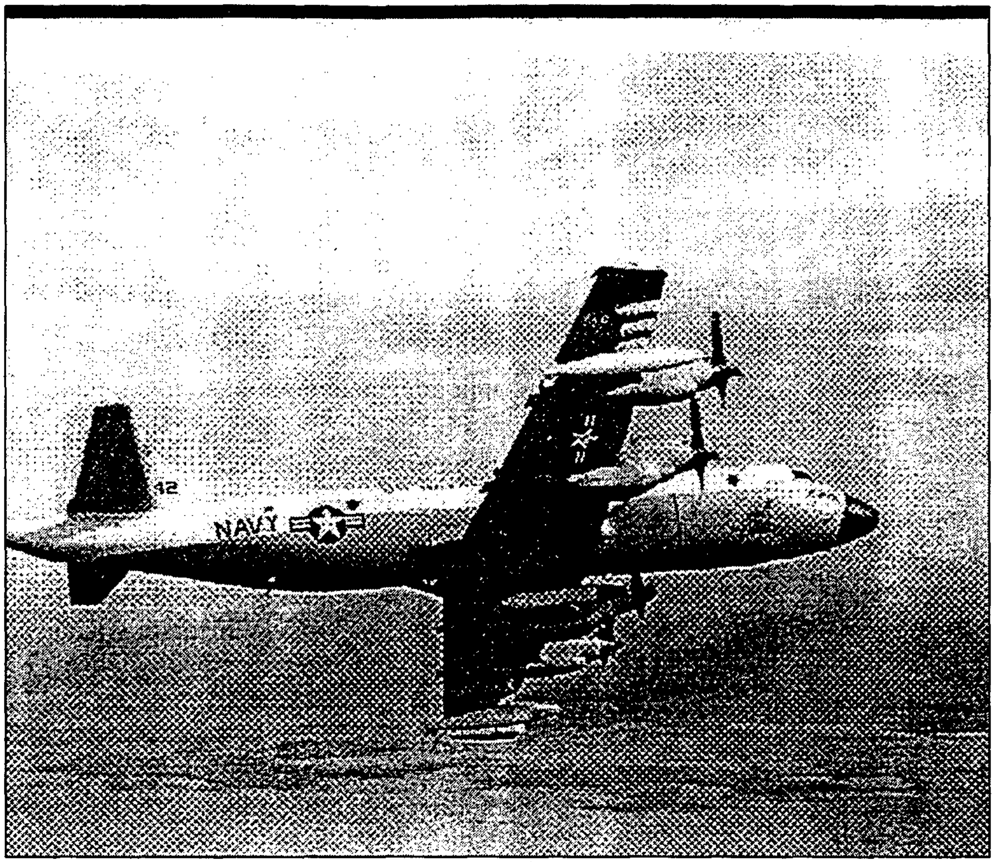


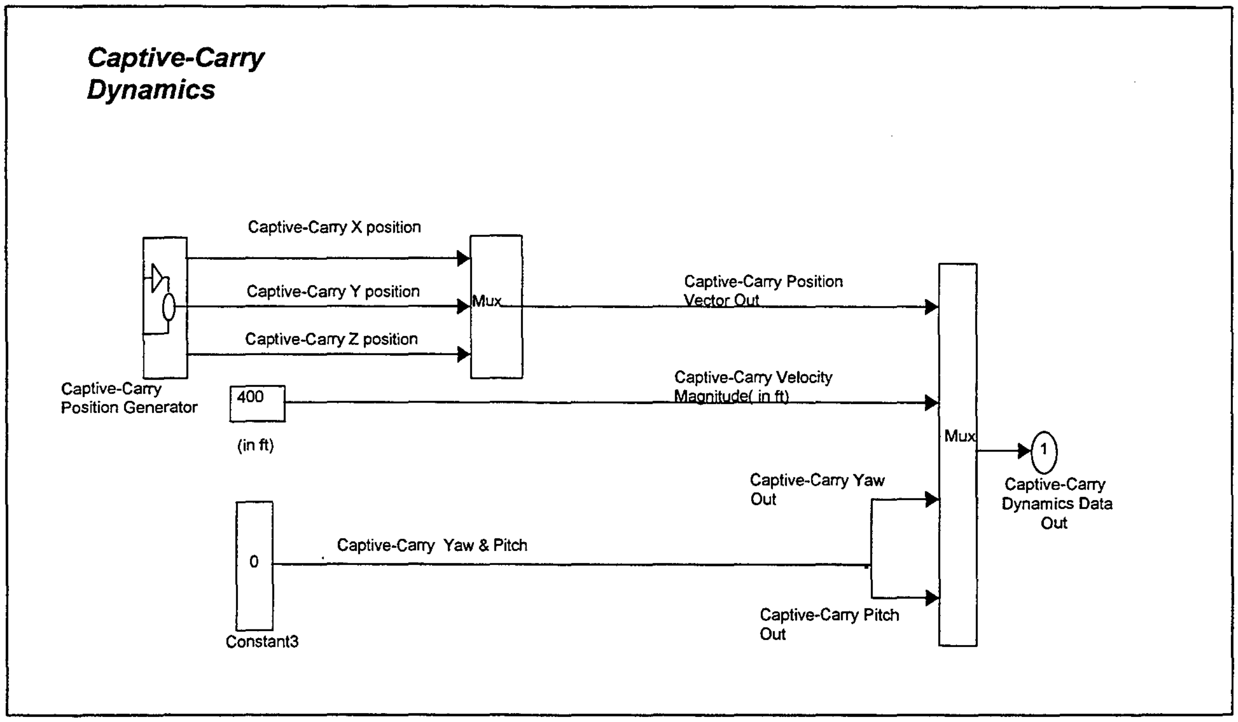
Figure 5.1. NRL P-3 Captive-Carry Research Aircraft Carrying the HIL Simulators

the aircraft dynamics data (position, velocity magnitude, pitch and yaw) required to simulate an aircraft flying as shown in Figure 5.3. It is composed of the captive-carry aircraft constantly adjusts its flight profile in order to cross over the ship. The Captive-Carry Position Generator sub-block shown in Figure 5.4 and two constant Simulink© sources that generate the captive-carry velocity (400 ft/sec), and the pitch and yaw information. For this model it was assumed that the pitch and yaw angles of the aircraft have values equal to zero in order to better identify the difference in seeker response between the two configurations.

In the Captive-Carry Position Generator block, the aircraft altitude is kept constant at 1000 feet during the simulation. For the X-Y plane, during each instant of the simulation, the aircraft to the current target position and the simulation is stopped when the aircraft crosses over the target as shown in Figure 5.3.

To implement these requests shown in Figures 5.4 and 5.5, the block receives the target X-Y position from the Target Generator block that is subtracted from the current aircraft position and thus generates a relative increment in the X and Y directions. Those increments are combined by a multiplexer block and introduced in a MATLAB© *function* block, which calculates the angle between them. The angle is used to calculate the aircraft X and Y current position by multiplying the cosine and sine of the angle by the aircraft speed.

The aircraft X-Y positions are sent together with the aircraft altitude to the Captive–Carry Dynamics block where the position information is combined in a 3 x 1 vector format and, and later combined again in a larger vector format with the other dynamic data generated in this block.



SUMMARY:

BLOCK: Captive-Carry Dynamics

SUB-BLOCK (s): Captive-Carry Position Generator

INPUT(s): None.

OUTPUT(s): Captive-Carry Dynamics Data:
Position,
Velocity Magnitude,
Yaw and
Pitch

AVAILABLE FUNCTION(s): None

Figure 5.2. Captive-Carry Dynamics Block

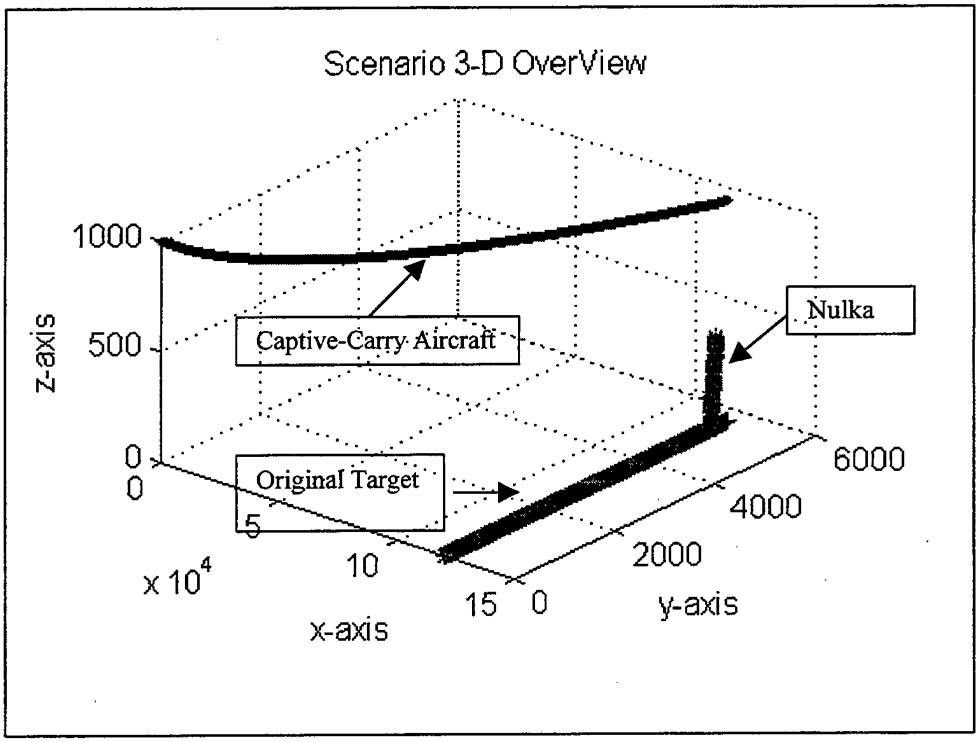
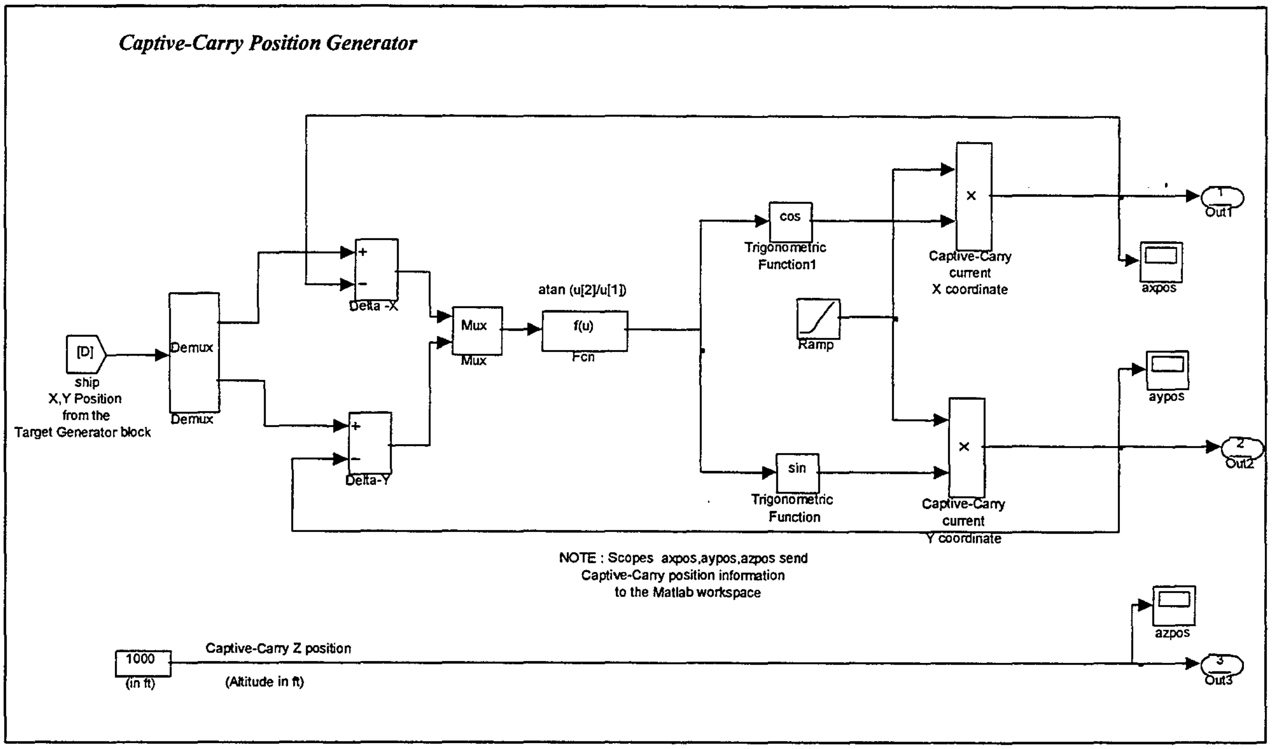


Figure 5.3. Captive-Carry Trajectory



NOTE : Scopes axpos,aypos,azpos send
Captive-Carry position information
to the Matlab workspace

SUMMARY:

BLOCK: Captive-Carry Position Generator

SUB-BLOCK(s): None.

INPUT(s): Ship X-Y Position from Target Generator block

OUTPUT(s): Captive-Carry Position

AVAILABLE FUNCTION(s): None.

Figure 5.4. Captive-Carry Position Generator Block

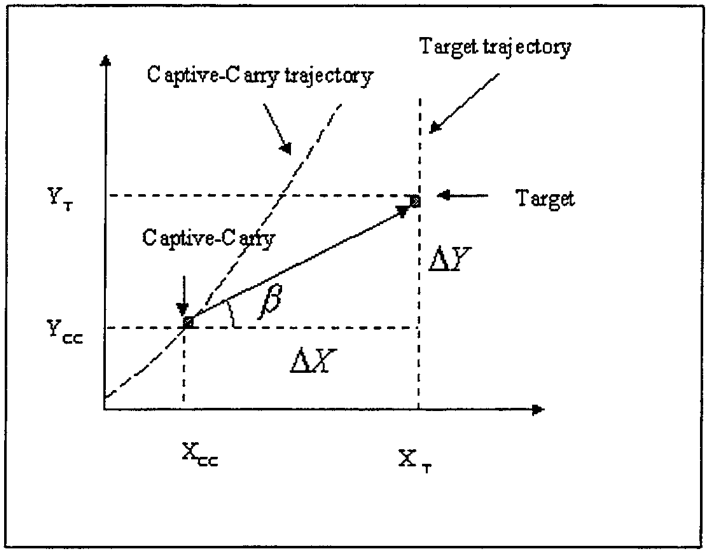


Figure 5.5. Example of Captive-Carry and Target Trajectories

Finally, when the aircraft crosses over the target, a singularity is calculated due to the target and aircraft position coincidence in the X or Y dimension and the simulation is stopped.

2. Selection of the Captive-Carry Experiment

For this thesis, both the closed and open loop simulations are available to be run using the GUI (Graphical User Interface) *Menu* (Appendix E). The next chapter shows how to select between the open and closed-loop configurations.

VI. GRAPHICAL USER INTERFACE (GUI) IMPLEMENTATION FOR ASCM DIGITAL CONTROL

A. GUIDELINES FOR BUILDING A GUI

A large number of simulations are needed in order obtain get data for studying the effects of the ASCM Digital Model parameters on the seeker responses. This large amount of data was the determining factor in designing a Graphical User Interface (GUI). The GUIs create a better user work environment, easily handle the initialization model as well as stores all the information generated by the simulation.

The design of the GUI followed a few basic principles: simplicity, harmony and friendliness. The goal of simplicity was to include in the GUI only the information that would be useful for the user such as what general switches were selected by clicking the simulation number on the popup list, updating the ASCM and seeker parameters automatically, and offering push buttons to run, store and graph the missile and captive-carry simulations. Harmony was reached by creating a few buttons to perform several functions without user supervision and confusion. Harmony makes it extremely easy to run the missile and captive-carry simulations without any big changes in the basic procedure described below.

Friendliness is aimed at allowing a user to learn very quickly how to run, save, store, and graph all simulation information for further analysis without being knowledgeable about the ASCM model. All the GUIs in this thesis and those presented in this section were created using the MATLAB© tool called *Guide* that allows a friendly user interface to create a GUI.

B. GRAPHICAL USER INTERFACES FOR A LARGE NUMBER OF SIMULATIONS

Two GUIs exist for running the large number of simulations. One GUI is for running simulations and data storing and the other is for graphing the simulations for both missile and captive-carry experiments. The GUI for running the simulations is called *Menu* and is presented in Figure 6.1. Its associated source code, *menu.m*, is in Appendix E. The GUI for graphing the simulations is called *simulations_plot* and it is presented in Figure 6.2. Its MATLAB© code, *simulations_plot.m*, is presented in Appendix F.

First, the GUI *Menu* is described. In Figure 6.1, eight work areas are divided by the following frames: Select Missile Simulation, Basic Settings, frame for running missile simulation, frame for captive-carry simulation, frame for graphing and exiting the GUI and also storing the simulation data in the MATLAB© workspace, ASCM Model Parameters, COSRO Parameters and Monopulse Parameters. The Select Missile Simulation frame has a popup list with odd numbers representing the closed-loop missile simulations and their parameters associated by the *initial.m* code and the structure ***I***. The default values are associated with the first simulation. The *update.m* code shown in Appendix G is the function associated with this popup list.

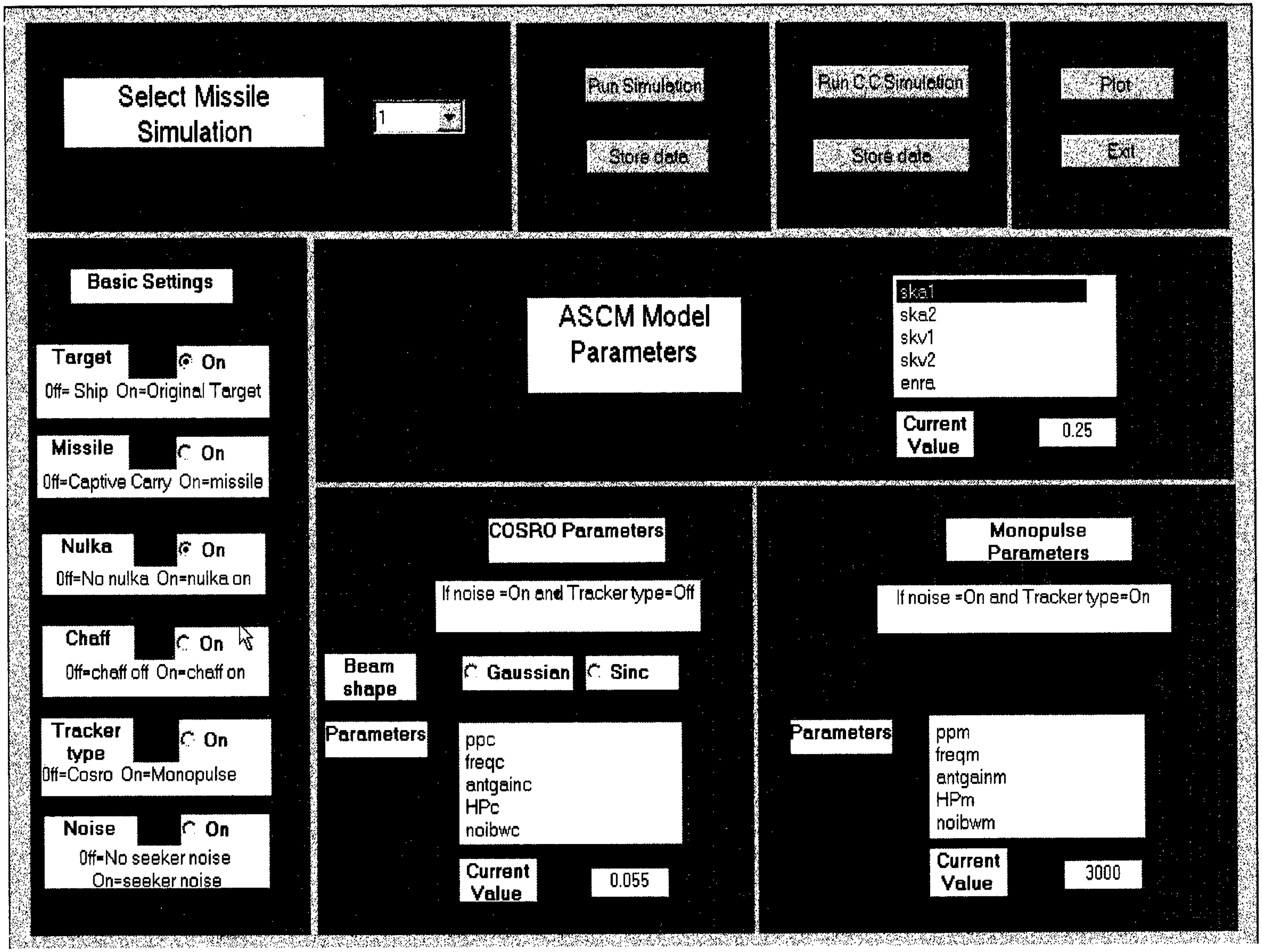


Figure 6.1. GUI Menu

The Basic Settings is a model setting status frame where the current selections of the model general switches are displayed depending on the simulation number selected. The Basic Settings frame shows if the simulation has the original target ("On"), target heading 000° at speed 12 knots, or has a ship ("Off") as target heading 090° at 10 knots. It also shows the type of simulation selected, closed-loop ("On") or the open-loop ("Off"); if the EA (Electronic Attack) Nulka decoy is available on board ("On") or not ("Off"); if the tracker type for the simulation will be a COSRO, default, ("Off") or a monopulse seeker ("On"), because the value of noise is a function of which seeker is selected and finally, if there will be a presence of noise ("On") or not ("Off") in the seeker of the model. There is also a field called Chaff, but in the present model, this function is not available. It was left on the GUI for further improvements in the model and to aid in the development of special features required later.

When the Tracker Type field is selected, COSRO ("Off"), it enables the radio buttons in the COSRO Parameters area. These parameters are related to the Beam shape (Gaussian - default- and *sinc* function). If the Monopulse seeker is selected ("On") both radio buttons will be turned off. The frame running missile simulations has two buttons: the *Run Simulation* button (up) and the *Store data* button (down). The first one only calls up the ASCM model and allows a user to run the selected simulation from the Simulink© ASCM Digital Model block. The latter is associated with the function *store_simulation.m* shown in Appendix I.

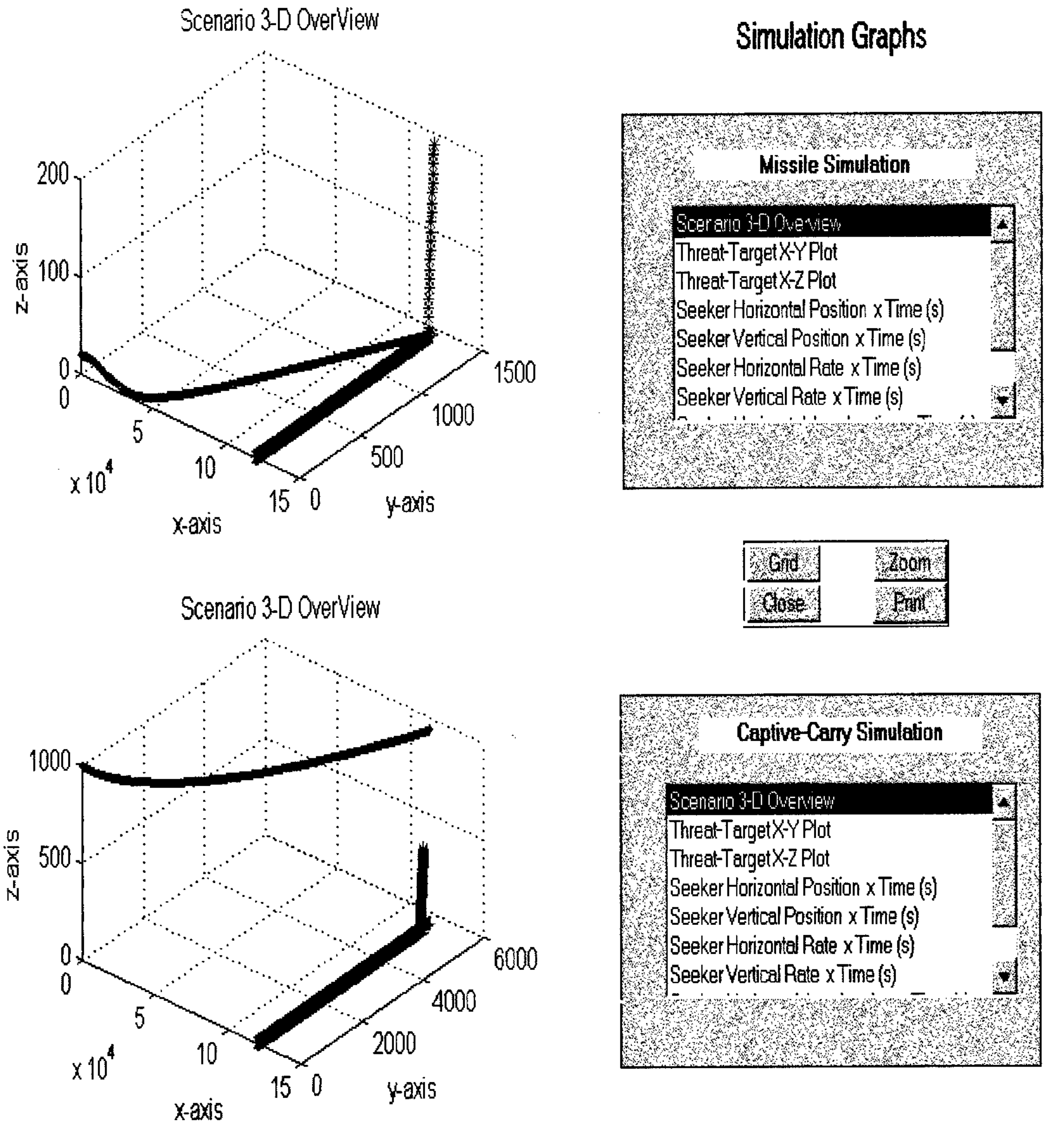


Figure 6.2. GUI Simulations_plot

The field for running captive-carry simulations also has two buttons: *Run C.C Simulation* (up) *and Store data* buttons (down). The *Run C.C simulation* runs the *update1.m* function shown in Appendix H and also calls up the ASCM model. The *Store data button* uses the function *store_simulation1.m* shown in Appendix J.

The next area is the one related to graphing the data stored for the selected simulation in the Select Missile Simulation list. The button Plot calls up the GUI *simulations_plot* shown in Figure 6.2. The other button in this area has a function to store the MATLAB© workspace containing the ***store*** structure which stores all the simulation data in a matrix called ***gold*** and also to close the GUI *Menu.*

The remaining frames, ASCM Model, COSRO and Monopulse Parameters, have the same format. First, they have a popup list with the parameters associated with the ASCM Digital model, with the COSRO seeker and with the Monopulse seeker, respectively. By scrolling and clicking on a specific parameter, the associated value of the selected parameter indexed by the simulation number in the structure ***I*** will be updated by *update.m* shown in Appendix G and *update1.m* shown in Appendix H and displayed below the popup list beside the *Current Value* text.

The purpose of the GUI *simulations_plot* after running a pair of simulations is to graph the information stored by the functions *store_simulation.m* shown in Appendix I for the closed-loop simulation, and *store_simulation1.m* shown in Appendix J for the open-loop simulation.

On the left side of the GUI in Figure 6.2, there are two graphs related to the missile (top figure) and captive-carry (bottom figure) simulations. On the right side, two large frames called *Missile Simulation* and *Captive-Carry Simulation* enclose the six possible selections of graphs available: Scenario 3-D, Threat-Target X-Y Plot, Threat-Target X-Z Plot, Seeker Horizontal Position x Time, Seeker Vertical Position x Time, Seeker Horizontal Rate x Time, Seeker Vertical Rate x Time, Seeker Horizontal Acceleration x Time, and Seeker Vertical Acceleration x Time.

The Scenario 3-D plot is the tri-dimensional representation of the players involved in the simulation: the threat (missile and captive-carry), the selected target (original target or ship) and Nulka trajectories. The Threat-Target X-Y and X-Z Plot graphs are representations of the same scenario of threat-target-Nulka but only in two dimensions. The other graphs, involving the seeker performance (position, rates and accelerations), are available to allow a user to measure, compare and study the seeker responses during the closed and open-loop engagement. Lastly, there is a small frame for both graphs that makes it possible to set the grid on the graphs (2-D and 3-D graphs), to zoom in on 2-D graphs and to print the present screen or close the GUI.

C. GUI CODES

1. *Update.m* Code

This code, shown in Appendix G, is associated with the popup list on the *Select Missile Simulation* frame. *Update.m* gets the value of the string index where the simulation number in the popup list is stored and converts it into two index values. One index called ***num*** is used to access the structure ***I*** and get the values of the model parameters. The other index is called ***index*** and is calculated to be an odd value to store the missile simulation results in the ***store*** structure. For executing several sequential simulations the first element of the global variable ***po*** (trigger time) is reset each time that *update.m* is called up. Also, each time *update.m* is called up it sets the values of the status radio buttons in the Basic Settings area associated with the value of ***num*** for the selected simulation. The General Switches are updated for a selected simulation as are the COSRO and mononpulse parameters with the values indexed in the ***I*** structure by the index ***num***. Finally, the values of the vector ***current*** (COSRO and Monopulse parameters) used for noise calculation are updated with the values of the selected simulation.

2. *Update1.m* Code

The *update1.m* code, shown in Appendix H, is associated with *the Run C.C Simulation* pushbutton in the captive-carry simulation frame. First, *update1.m* reinitializes the Nulka trigger time and then it changes the value of the storage ***index*** to get the even valued simulations. The even valued positions are used to store the captive-carry results in the structure ***store***. The value of the variable ***carry*** in the initialization structure is set to zero. Finally, the threat status radio button in the Basic Settings is updated to reflect the captive-carry simulation. The other parameters are the same as those of the closed-loop simulation where the parameters are indexed by ***num*** because similar conditions are required for both experiments except the threat vector and the parameters cited above. The values of the vector ***current*** (COSRO and monopulse parameters) used for noise calculation in captive-carry simulation are also updated with the values of the selected simulation.

3. *Store_simulation.m* Code

The store_simulation.m code is shown in Appendix I is activated by pressing the *Store data* pushbutton in the missile simulation area. It creates cells for storing the miss distance (after its calculation), simulation time, seeker performance data (position, rate and acceleration) for the azimuth and vertical channels, the ASCM model parameters, the COSRO/Monopulse seeker parameters, and the missile, target and Nulka position. These values are stored in the ***store*** structure (odd positions store missile simulations, and even positions store captive-carry simulations).

4. *Store_simulation1.m* Code

This code shown in Appendix J is associated with the *Store data* pushbutton in the captive-carry simulation area. It creates cells for storing miss distance (typically a constant value in the captive-carry experiment), simulation time, seeker performance data, the ASCM model parameters, the COSRO/monopulse parameters and the captive-carry, ship and Nulka position. The last step executed by this function is to set the ***carry*** variable value back to one. The Nulka trigger time for the next simulation is reinitialized and decreases by one the storage ***index***.

5. *Plot1.m* and *Plot2.m* Codes

The *plot1.m* and *plot2.m* codes are described together because there are no major differences between them except for the ***index*** value that accesses the values stored in the structure ***store***. For odd index values (*plot1.m*), the missile simulations data are stored in auxiliary variables and, after that, depending on the graph selection made in the Missile Simulation frame, the graphs are presented in the upper left side on the GUI *simulations_plot*. For even ***index*** values, the procedure is the same, except that the captive-carry position and the results associated with the open-loop simulations are the ones stored and graphed in the left bottom side of the GUI.

D. PROCEDURES TO RUN SIMULATIONS USING *MENU*

A few steps are necessary to run, store and graph simulations involving both the missile and captive-carry threat for the same tactical conditions. They are briefly discussed in this section.

The first step in the MATLAB© prompt is to call up the *initial.m* code and set the initialization model parameters with their default values. The GUI *Menu* will pop up after the initialization process.

The second step is to select the simulation number desired. The *update.m* code automatically updates the Basic Settings status radio buttons as well as the other model parameters for the missile simulation.

The third step is to press the *Run Simulation* pushbutton in the missile simulation area that calls up the Simulink© ASCM Digital Model.

The fourth step stores the missile simulation results by pressing the *Store data* pushbutton in the same missile simulation frame calling up the *store_simulation* code.

The fifth step is to switch to the captive-carry simulation by pressing the *Run C.C Simulation* in the captive-carry simulation area and calling up the *update1.m* code.

The sixth step is to store the captive-carry simulation data.

If simulation graphs are desired pushbutton *Plot* calls up the GUI *simulations_plot*. If more simulation runs are required, the user must start over from Step

1 again. It is also possible to run all the simulations in the Select Missile Simulation number list, to store all of them and then to compare the simulation results in the *simulations_plot* GUI for the selected simulation number. The last procedure was the one used for this thesis due to the large number of simulations required.

VII. COMPARISON OF SEEKER SIGNALS

The results of the captive-carry simulations are the seeker angles and the range-to-target. The closed-loop simulations, on the other hand, give us the additional information of a miss distance.

Despite the differences between the closed-loop and open-loop simulations, it is instructive to compare the seeker responses from both configurations. Several simulations (simulations 313, 633, 953, 1273, 1593, 1913, 2233, 2553, 2873, 3193, 3513,3833,and 4153 in Appendix M) were run to give the data necessary to compare the seeker signals of each simulation.

The simulations used to get, to graph and to compare the seeker output results were obtained utilizing the following settings:

- The Original Target is the target selected (***swtsh*** =1);
- The Nulka decoy is activated (***nlk*** =1);
- The threat seeker is monopulse (***seltrac*** =1);
- There is noise in the monopulse seeker (***noise*** =1);and
- The time-to-go setting is 14 seconds (**ttg** =14).

The model parameters, ***ska1***, ***ska2***, ***skv1***, ***skv2***, ***enra***, ***enrb***, ***ta1***, ***ta2***, ***tb1***, ***tb2***, ***tm***, ***tmv***, and ***tv***, were set to their highest values in Table 4.2. The resultant graphs present the missile and the captive-carry seeker responses for each parameter mentioned above. The seeker responses for this model are the seeker horizontal position, seeker vertical position, seeker horizontal rate, seeker vertical rate, seeker horizontal acceleration and seeker vertical acceleration.

After comparing the results from the graphs an algorithm can be developed in order to obtain an accurate miss distance prediction from the captive-carry results. An example of this type of an algorithm is discussed in [Ref. 9] .

In this thesis, a similar approach is developed. This approach consists of using a neural network to predict a missile trajectory from the captive-carry experiment in order to get the effectiveness measurement prediction. The neural network approach is made possible because of the range of values of the closed-loop experiments used to train the neural network are similar to the results obtained from the captive-carry experiment, as is shown in the following graphs.

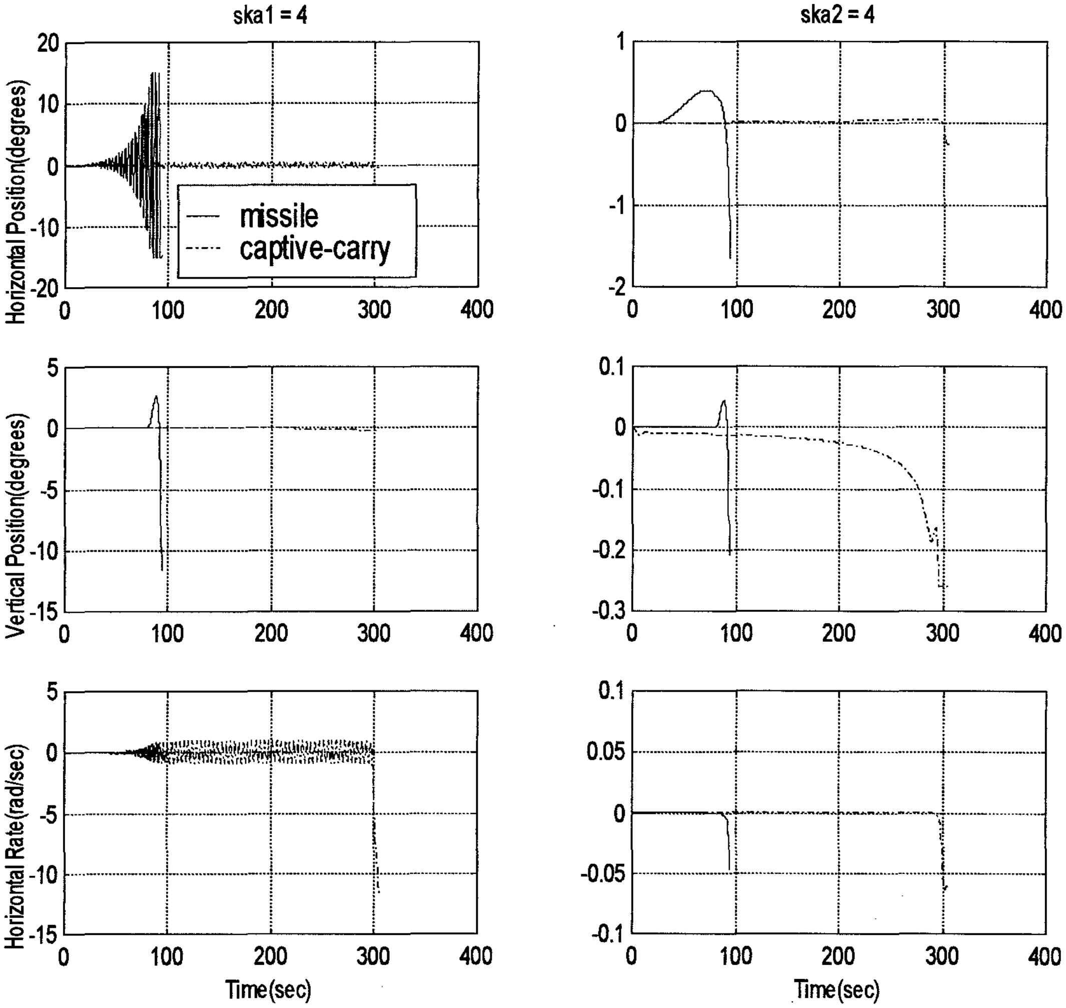


Figure 7.1. Seeker Response Comparison for *ska1* and *ska2*

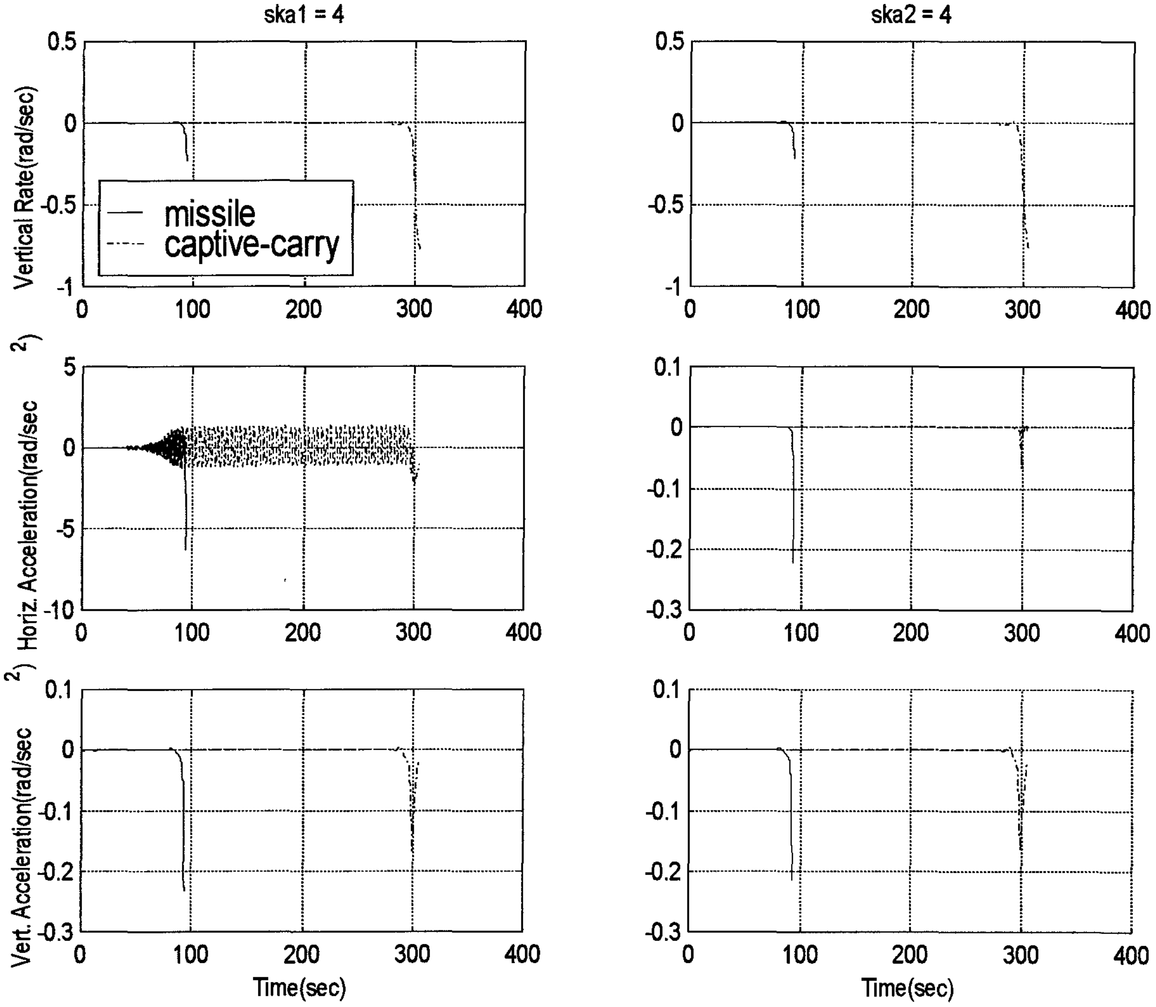


Figure 7.2. Seeker Response Comparison for *ska1* and *ska2*

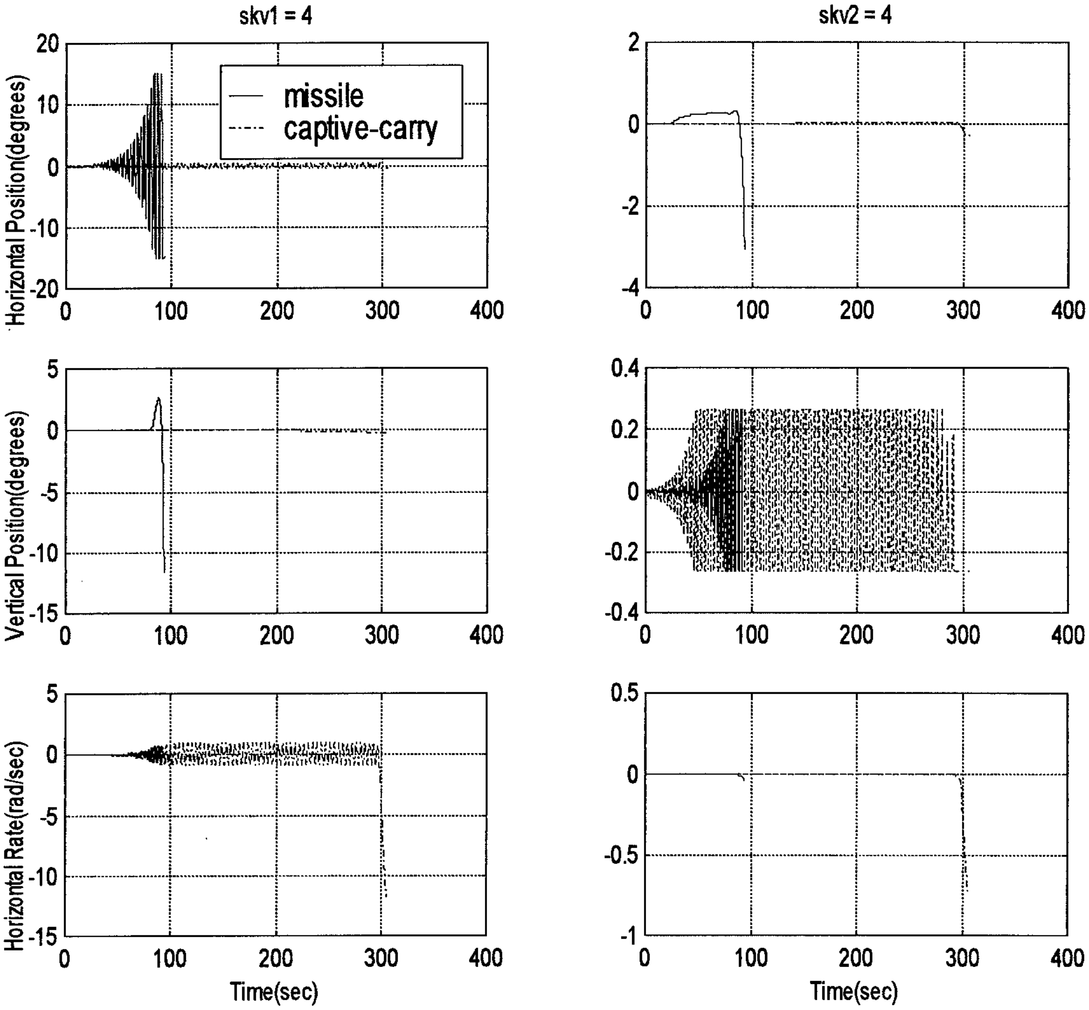


Figure 7.3. Seeker Response Comparison for *skv1* and *skv2*

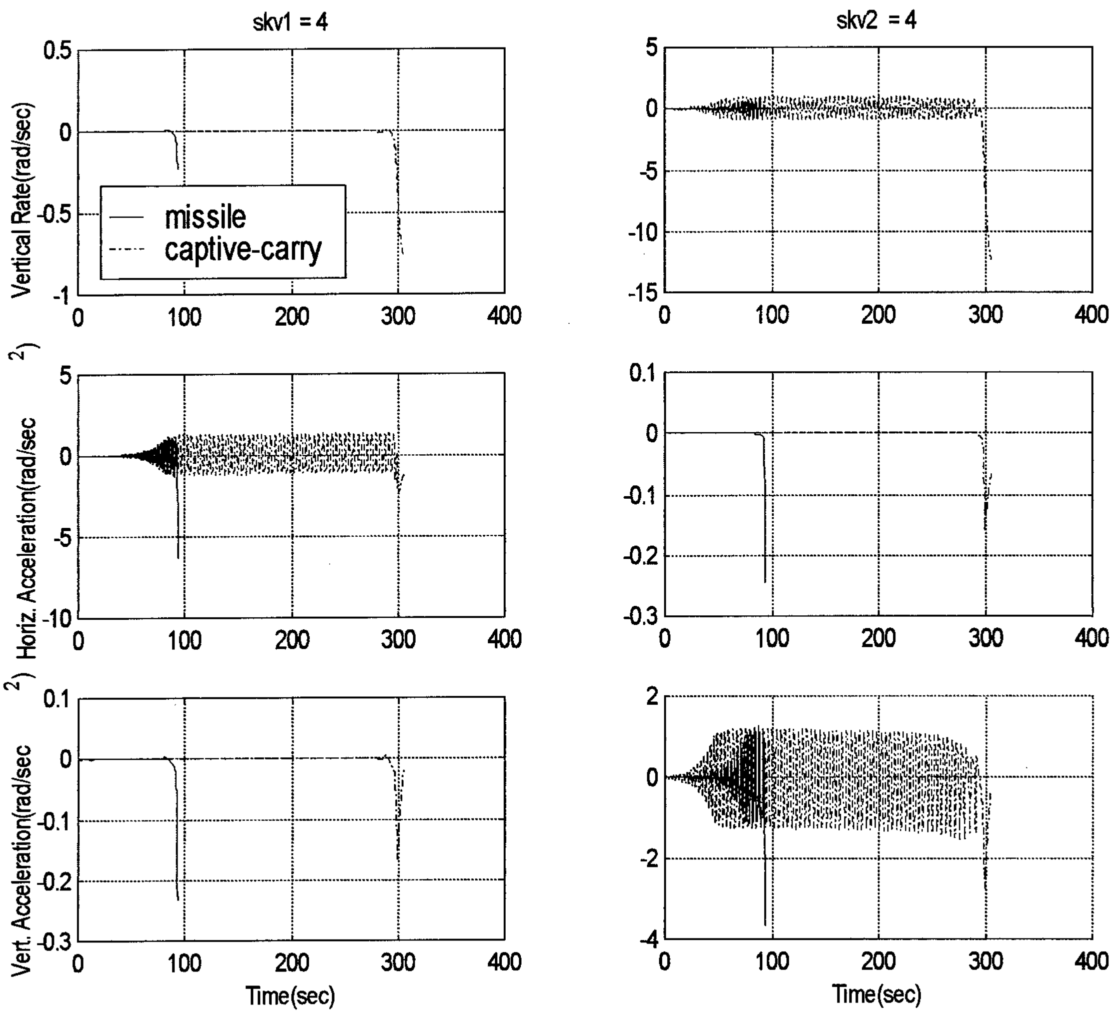


Figure 7.4. Seeker Response Comparison for *skv1* and *skv2*

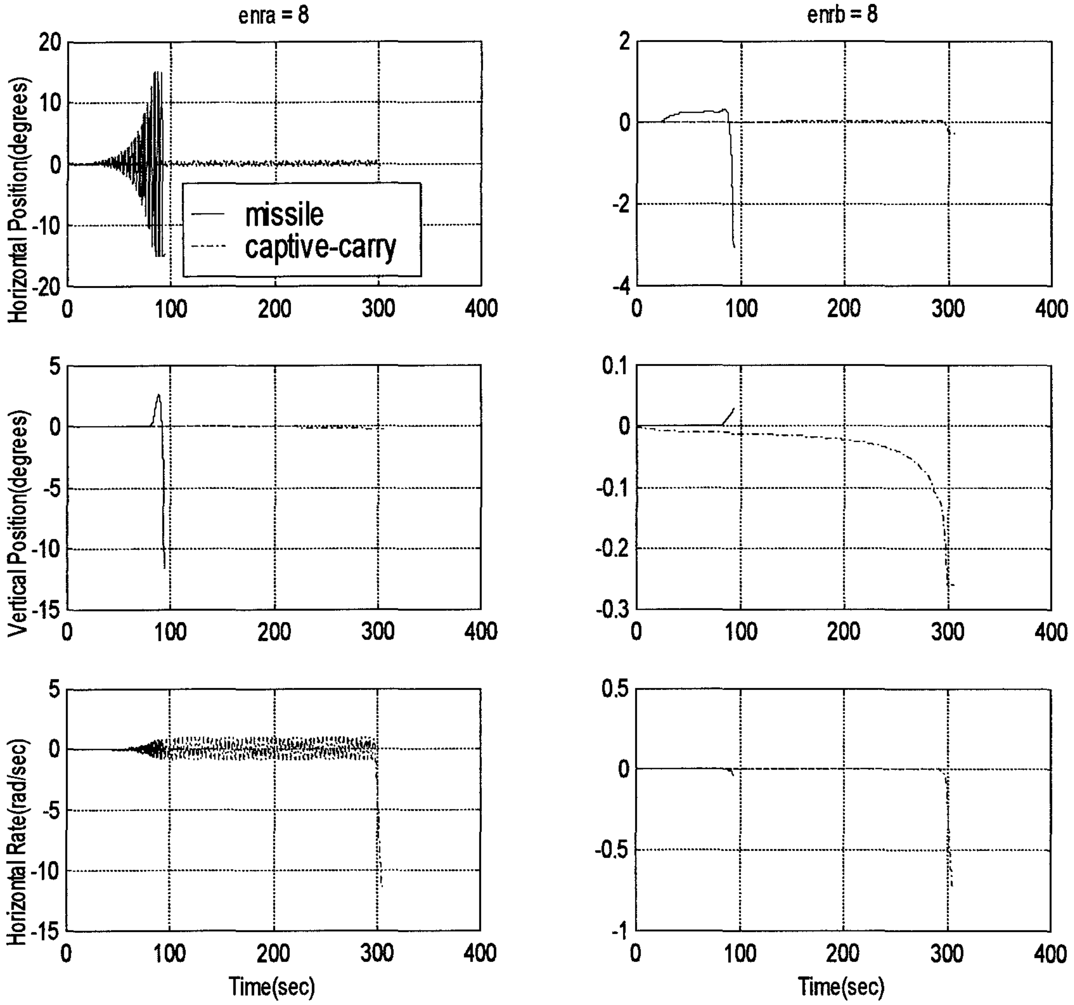


Figure 7.5. Seeker Response Comparison for *enra* and *enrb*

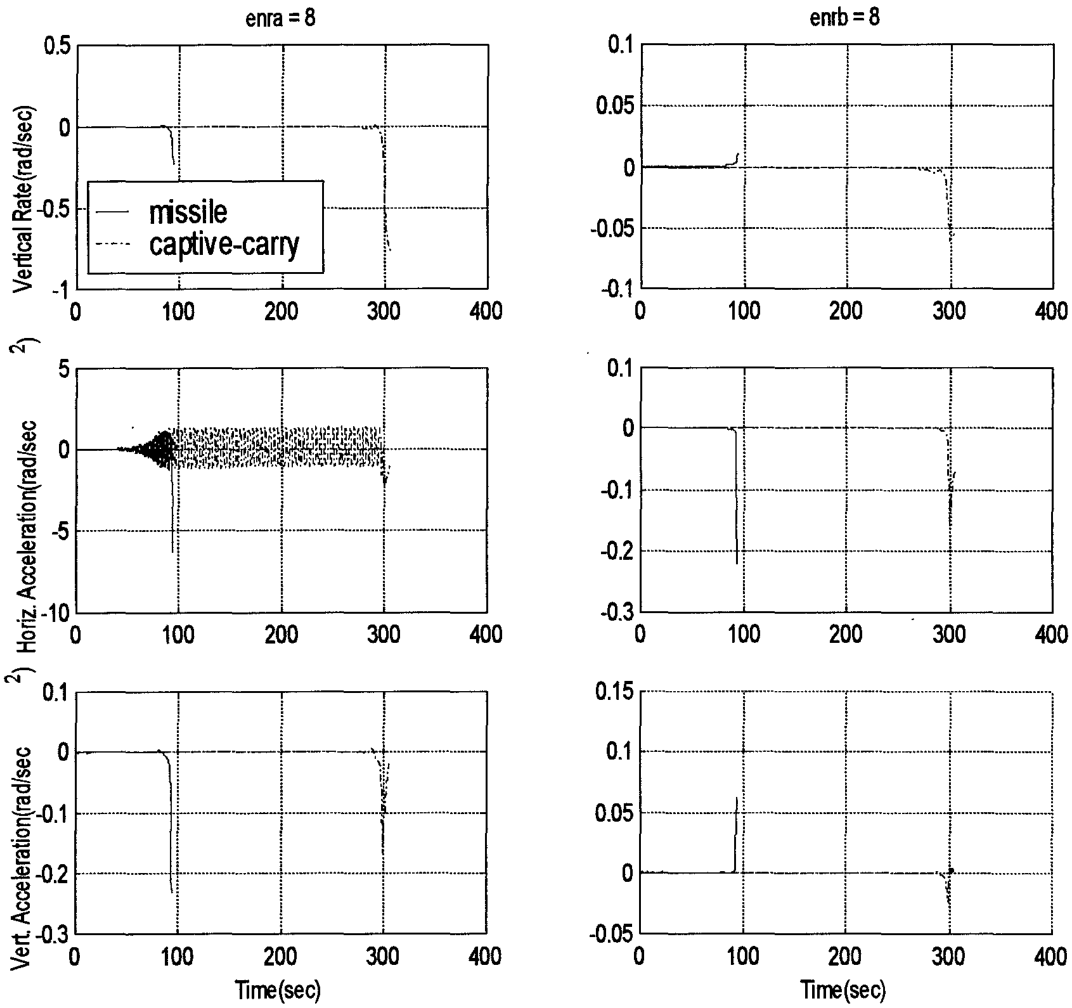


Figure 7.6. Seeker Response Comparison for *enra* and *enrb*

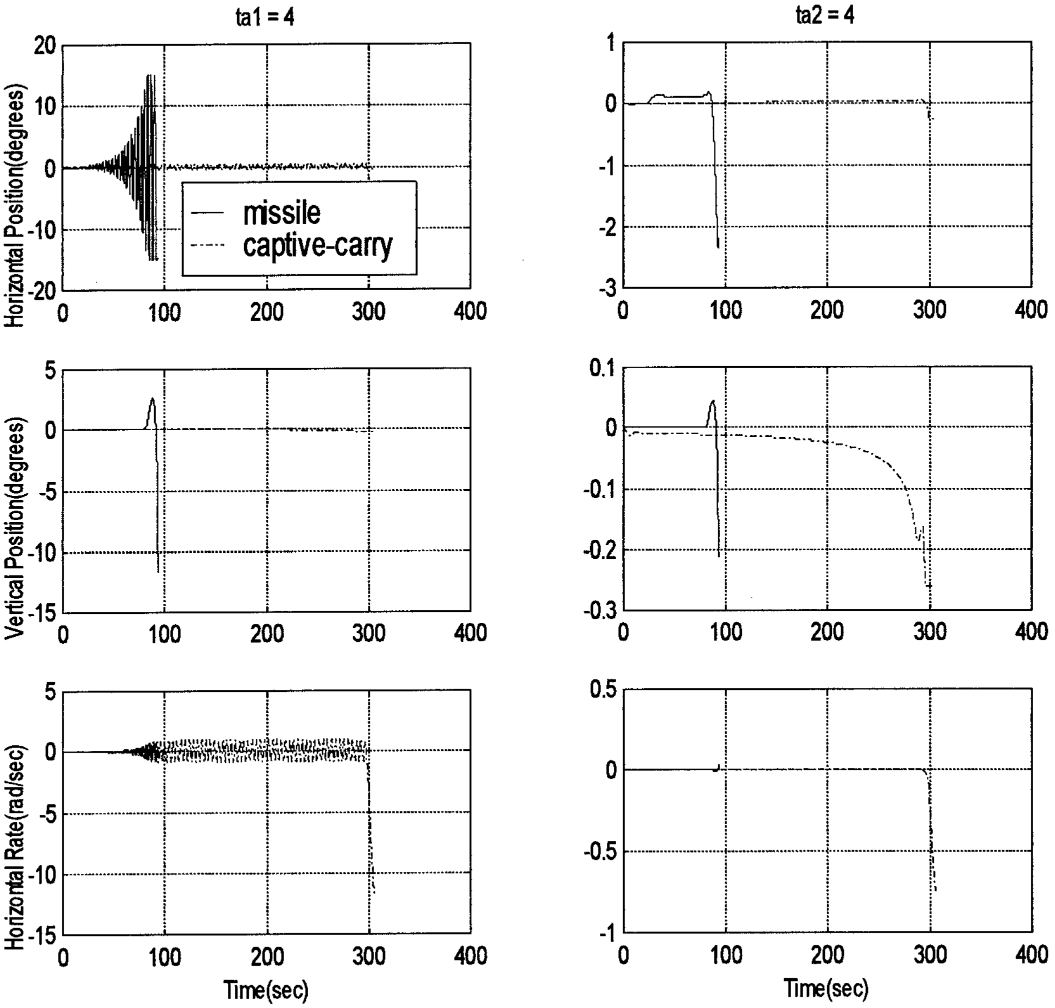


Figure 7.7. Seeker Response Comparison for *ta1* and *ta2*

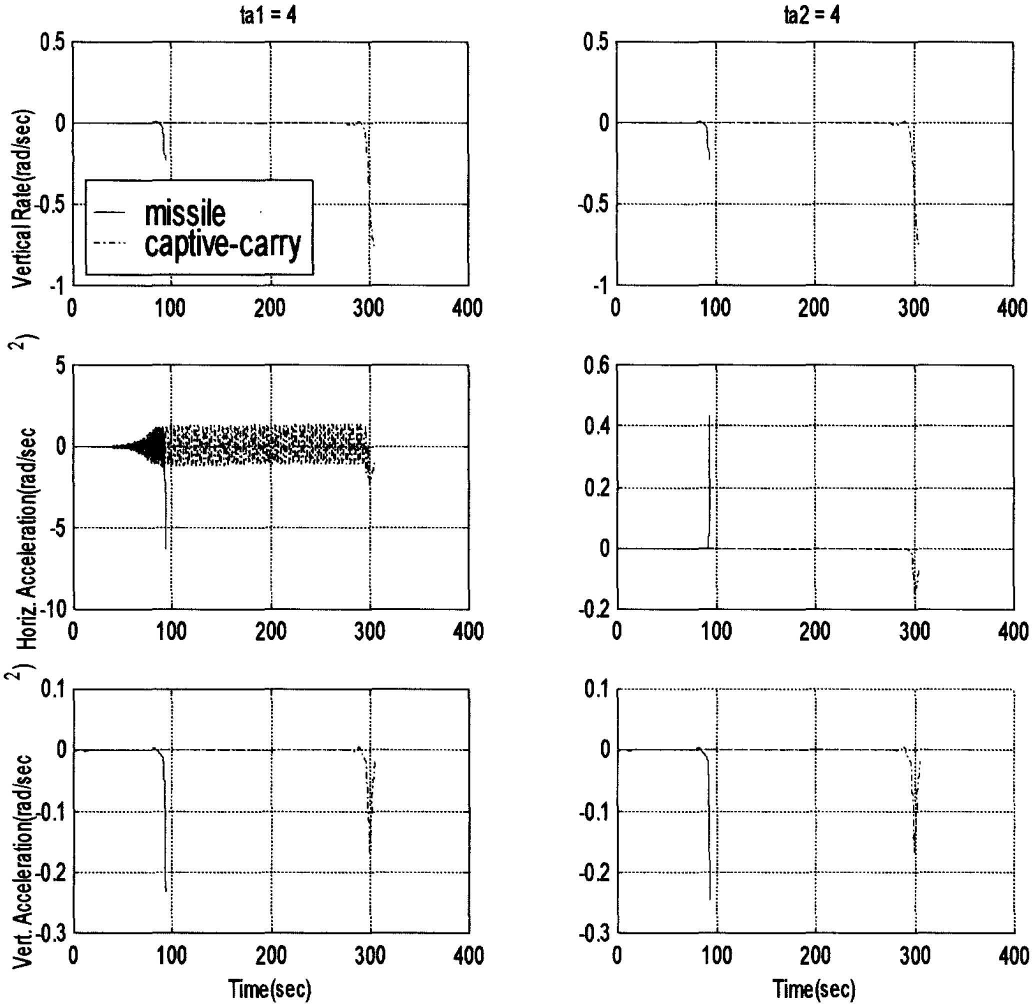


Figure 7.8. Seeker Response Comparison for *ta1* and *ta2*

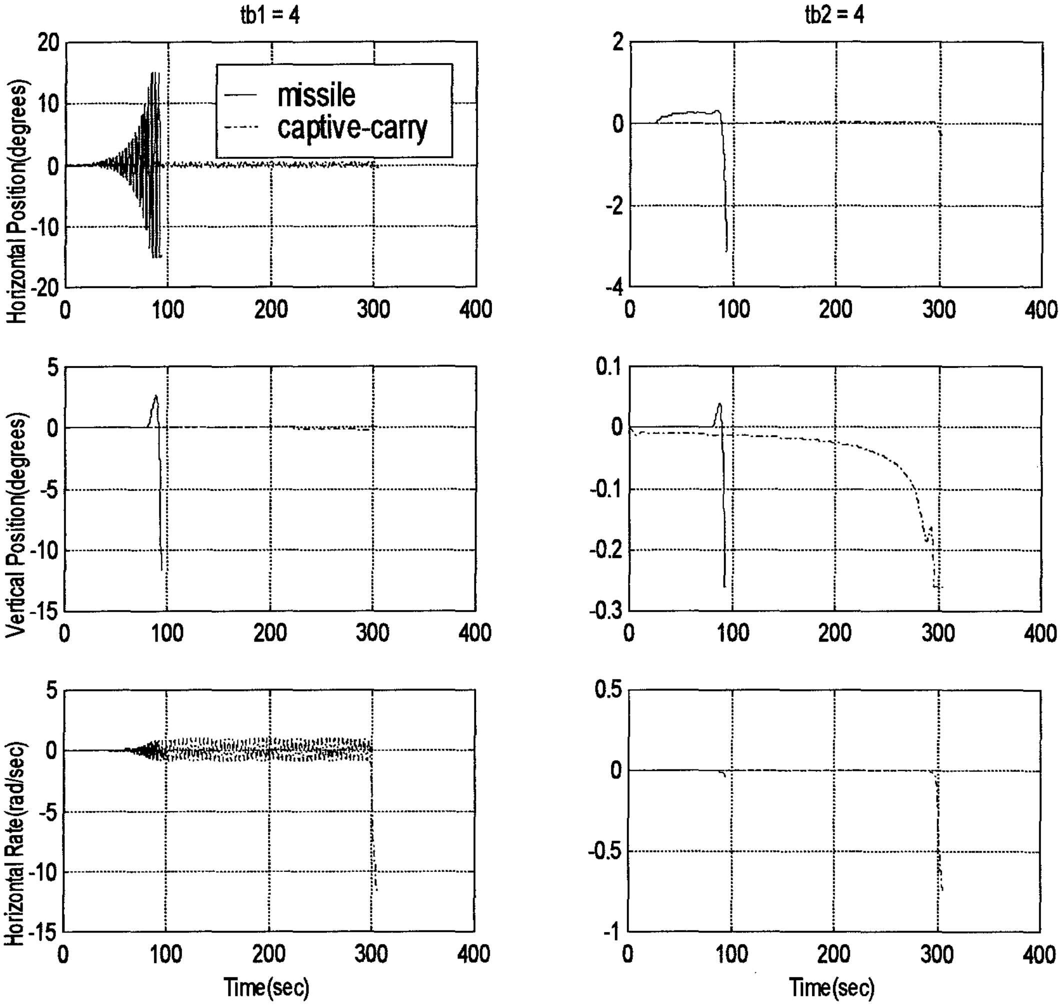


Figure 7.9. Seeker Response Comparison for *tb1* and *tb2*

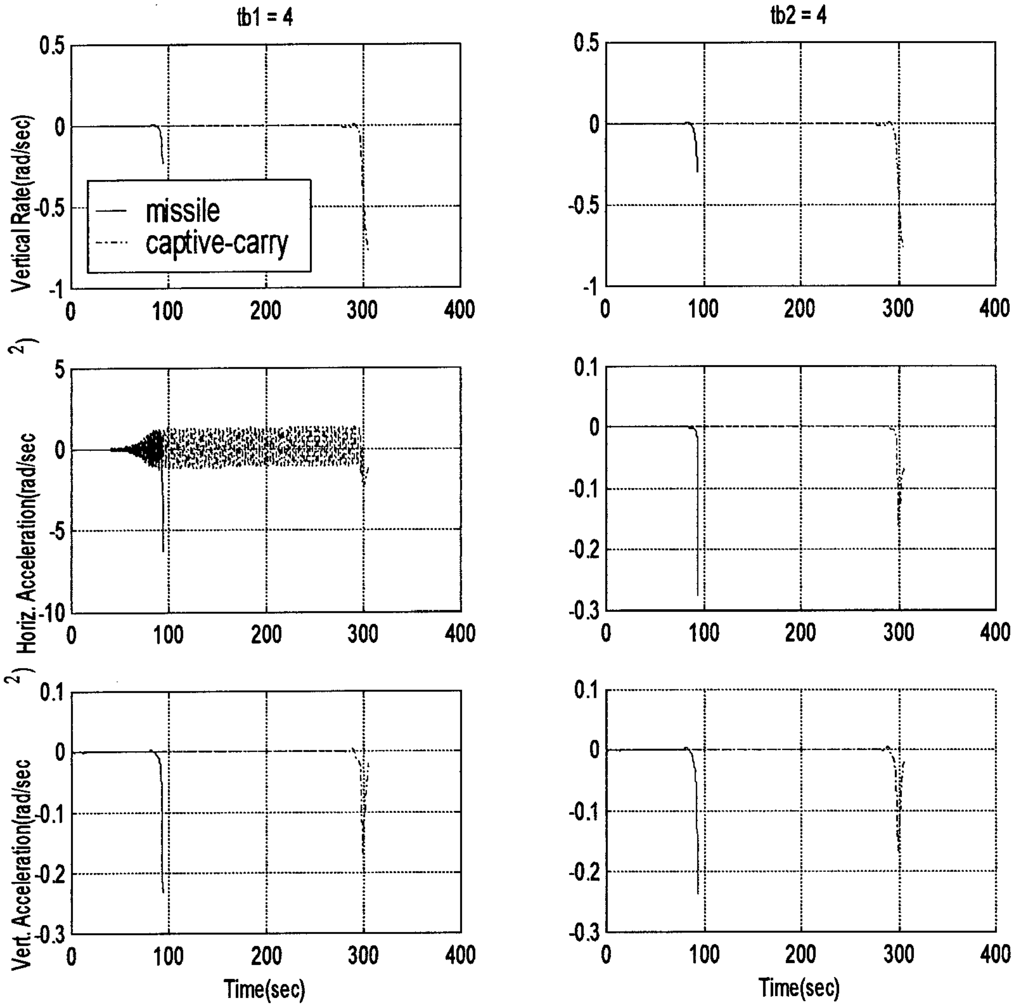


Figure 7.10. Seeker Response Comparison for *tb1* and *tb2*

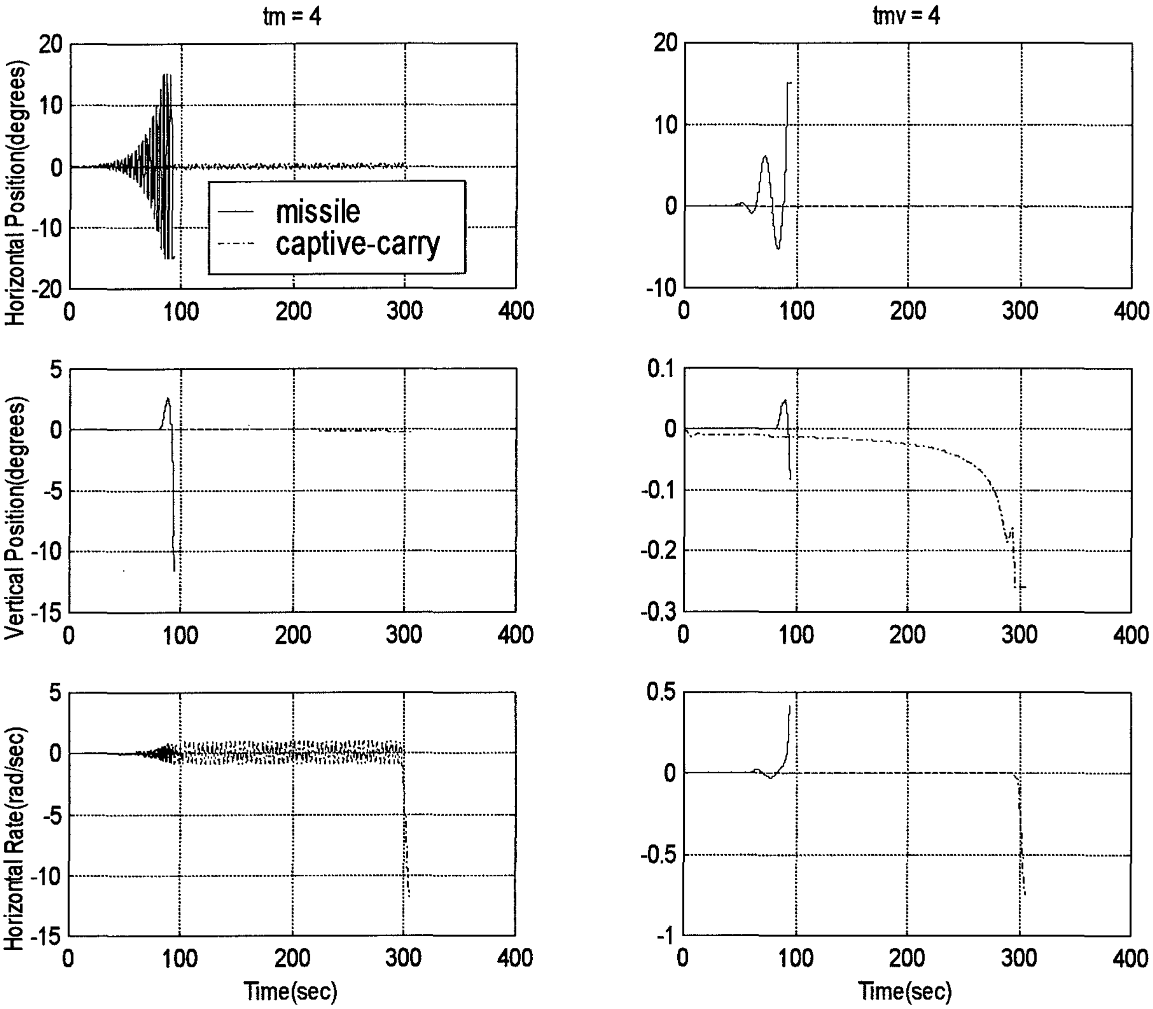


Figure 7.11. Seeker Response Comparison for *tm* and *tmv*

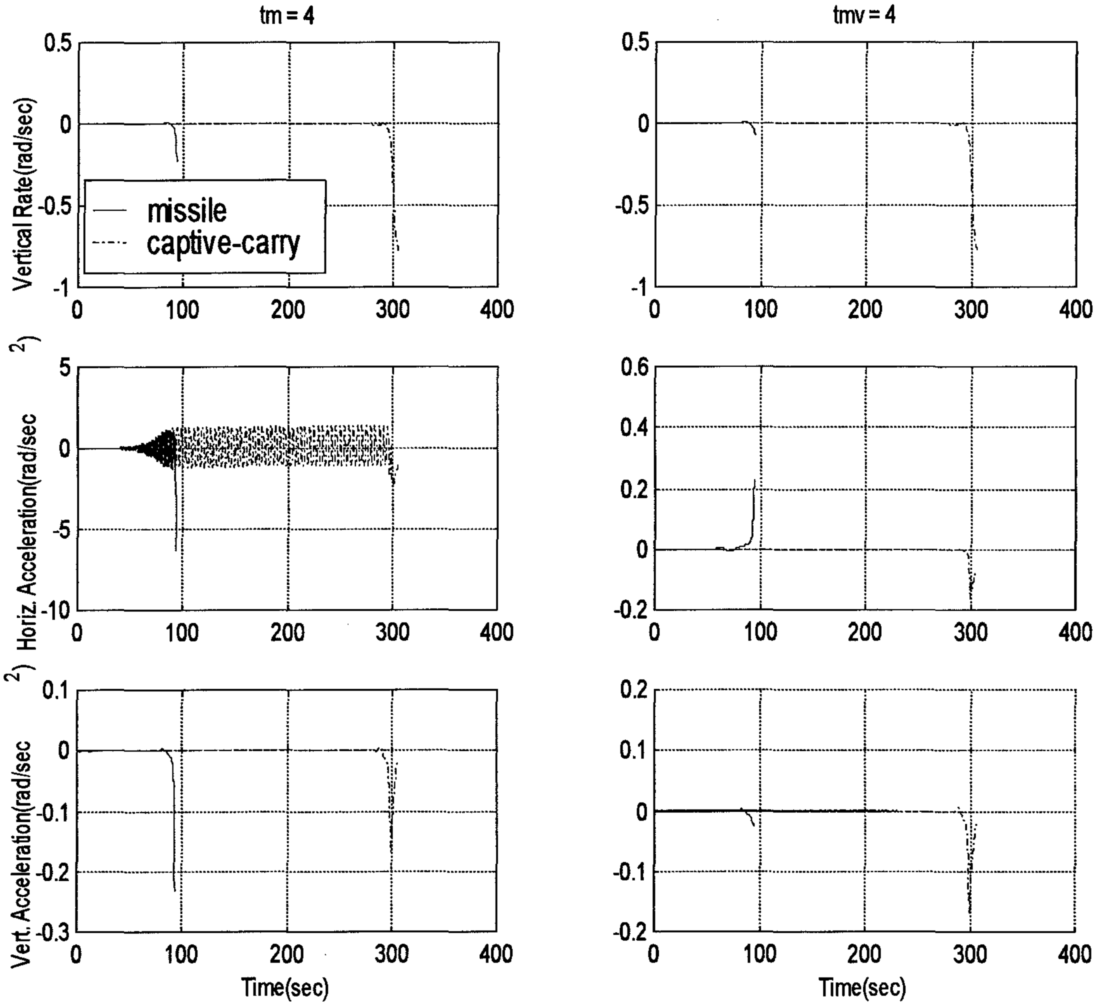


Figure 7.12. Seeker Response Comparison for *tm* and *tmv*

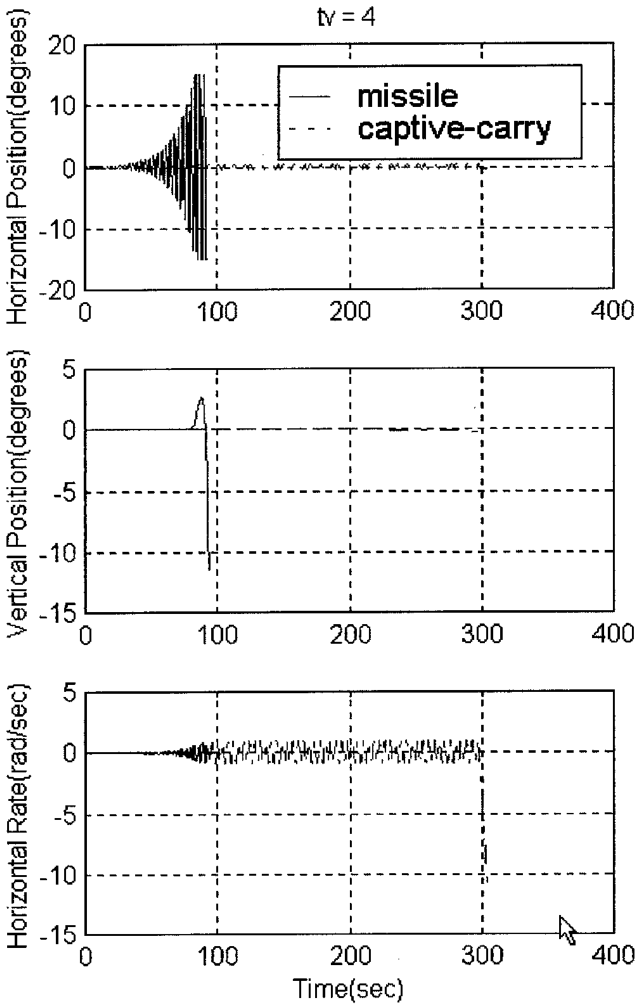


Figure 7.13. Seeker Response Comparison for *tv*

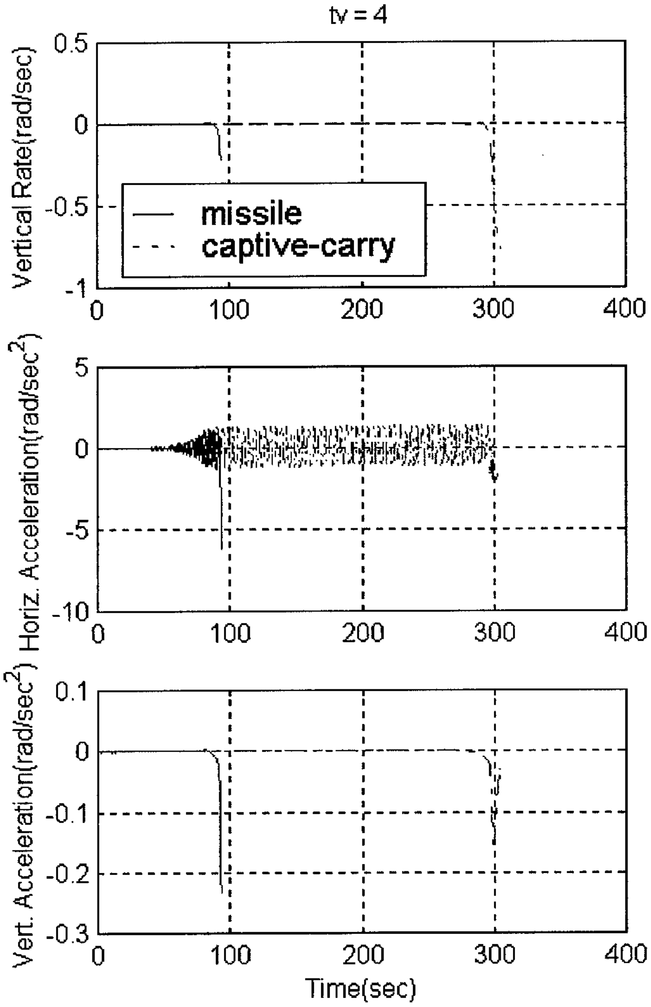


Figure 7.14. Seeker Response Comparison for *tv*

VIII. MISS DISTANCE PREDICTION FROM THE CAPTIVE-CARRY SIMULATION

A. INTRODUCTION

Chapter VII demonstrated that the seeker responses of the closed-loop and open-loop experiments have, in most of the simulations, similar results. This work combines the results of the missile and the captive-carry experiments to generate a single miss distance. In [Ref. 8] Neural Networks are used to predict the missile trajectory using only the seeker response obtained from the captive-carry results: range (R), azimuth (ϕ) and elevation (θ). Before being combined with the closed-loop results, the captive-carry results were pre-processed in order to adjust the data so that the differences in configurations were taken into account. In this work the captive-carry simulation results are processed by a trained neural network (NN) directly without any type of pre-processing to account for these configuration differences.

Neural networks, as defined in [Ref. 9],

> (...) are composed of simple elements operating in parallel. These elements are inspired by biological nervous systems. As in nature, the network function is determined largely by the connections between elements. We can train a neural network to perform a particular function by adjusting the values of the connections (weights) between elements. Commonly neural networks are adjusted, or trained, so that particular input leads to a specific target output (...).

Figure 8.1 shows a basic training process in a neural network.

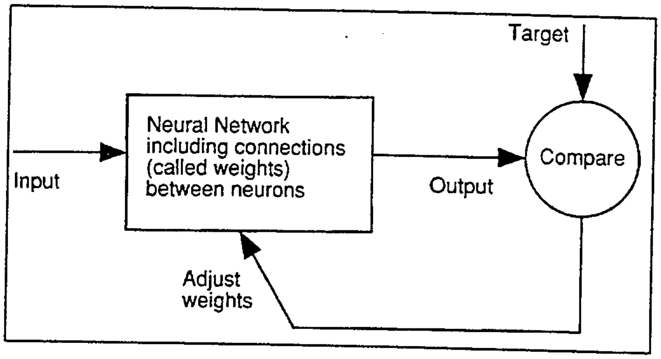

Target
Neural Network including connections (called weights) between neurons
Compare
Input
Output
Adjust weights

Figure 8.1. Neural Network Basic Training Process (After [Ref. 10])

In [Refs. 10 and 11] a good introduction to neural network theory is provided. In this paper, several steps were followed to reach our goal of generating the missile trajectory from the captive-carry seeker outputs. First, a simulation set was established, shown in Appendix N, with both the missile and captive-carry simulations. Those simulations were run using the ASCM Digital Model and GUI *Menu,* and the results from the two configurations were obtained. Second, after running the simulations, a neural network (NN) was created, its settings defined, and the NN trained. In the NN training, the weights and biases of the network are updated to get the desired target outputs (the actual missile position) from the missile seeker R, ϕ and θ inputs. The third step was testing the network with another actual missile simulation data set and comparing the NN output with the actual missile trajectory. Finally, when the neural network was trained and tested, the captive-carry seeker outputs (R, ϕ and θ) were introduced as inputs to the NN to generate a missile trajectory prediction.

B. ASCM DIGITAL MODEL CONFIGURATION FOR THE NEURAL NETWORK

Appendix N shows the spreadsheet that contains the simulations used to establish the tactical scenario for the open and closed-loop simulations. The tactical scenario is as follows:

- The target is the Original Target (***swtsh*** = 1), the Nulka decoy is activated (***nlk*** = 1), the threat is a missile (***carry*** = 1), the missile seeker is monopulse (***seltrac*** = 1) and there is noise in the selected seeker (***noise*** = 1)
- The other ASCM Digital model parameters are set to the default values
- The noise in the monopulse seeker is the random factor among the 100 simulations run

The *initial.m* code was slightly modified in order to store the new values of the model parameters. Also, the GUI *Menu* was modified to store the simulation results in a distinct matrix (***goldxx.mat***).

C. TRAINING AND TESTING THE NEURAL NETWORK

This section discusses the required steps to establish a neural network (NN) that is able to predict the missile dynamics from the captive carry experiment. In the first step, the neural network is designed and shown Figure 8.2.

Where:

N = number of inputs or features (N=3, R, ϕ and θ)

p = input matrix

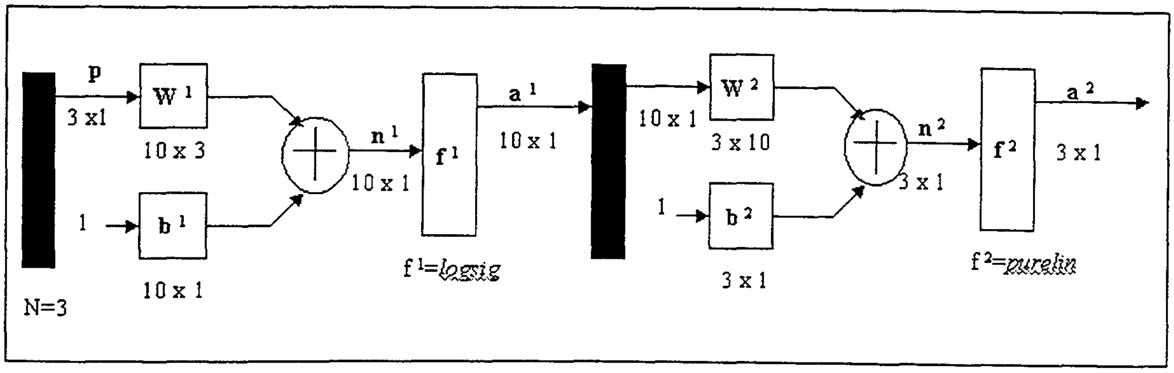


Figure 8.2. Neural Network Configuration for Missile Dynamics Prediction

b = neuron biases vector

W = weight matrix

n = result from the operation **Wp+b**

f = transfer function (in our NN, the first layer has a log sigmoid (*logsig*) and the second layer has a linear (*purelin*) transfer functions)

a = neural network layer output

The number of neurons in the first layer is 10 and 3 in the second layer. The NN was set to feedforward. There is no feedback of the NN outputs to the NN inputs. The *superscripts* 1 and 2 in Figure 8.2 indicate that the neural network chosen for our prediction has two layers. It was decided that the acceptable error for weight convergence was 10^{-6}.

For the NN training, a supervised learning rule is used. The learning rule (the procedure for modifying the weights and biases of the network) uses R, ϕ and θ for each time increment in the 45 odd missile simulations shown in Appendices N and O. The outputs were the corresponding missile positions. Due to the non-linear nature of the inputs and outputs, the first layer of the NN has a non-linear transfer function called log sigmoid (*logsig* function in MATLAB©) as shown in Figure 8.3. A linear transfer function (*purelin* function in MATLAB©) is used for the second layer as shown in Figure 8.4. The Levenberg-Marquardt (LM) training algorithm is used (*trainlm* in MATLAB©) since it is considerably faster than backpropagation. This algorithm reduces the mean square error stet of 10^{-6} or a selected number of iterations (500). The training and testing MATLAB© codes for the NN are shown in Appendix O. The minimum error is reached after 14 epochs for the first training set, 14 also for the second, and zero for the third.

The NN testing is done using the odd missile simulations 5, 15, 25, 35, 45, 55, 65 and 75 shown in Appendix N. The NN results are presented in pairs by Figures 8.5-6, 8.7-8, 8.9-10, 8.11-12, 8.13-14, 8.15-16, 8.17-18, 8.19-20. The first figure of each pair presents the seeker inputs to the NN from the close-loop experiment and the second graph in the pair presents the comparison between the real and predicted missile trajectory and the mean square error between the two trajectories. Table 8.1 presents the miss distance obtained from the missile simulation and the NN prediction.

D. MISSILE TRAJECTORY PREDICTION USING THE NEURAL NETWORK

After training and testing the NN using the R, ϕ, θ, values from the missiles seekers as input, and the missile position as the desired output, the NN is now ready to be used to predict the missile trajectory using the R, ϕ, θ, values from the captive-carry seeker. Those values can be used as inputs to the NN and are expected to give valid

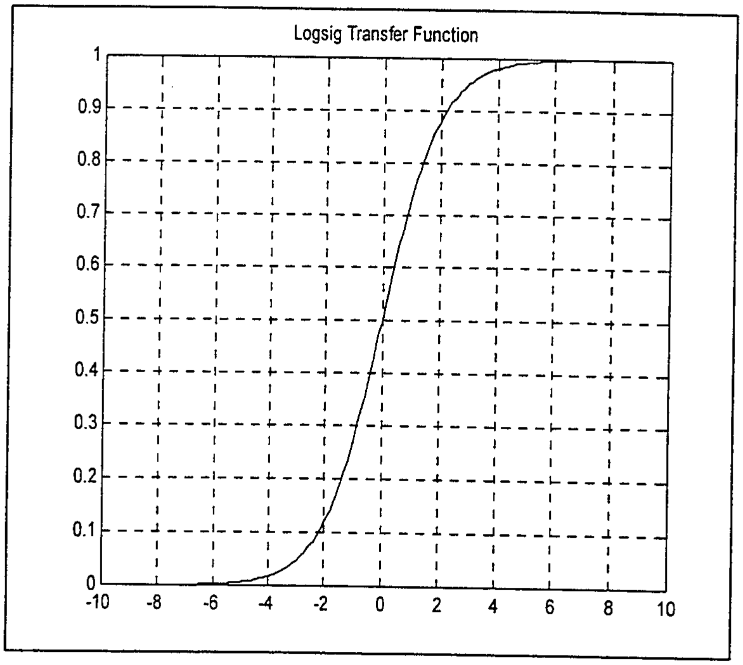


Figure 8.3. Log Sigmoid Transfer Function

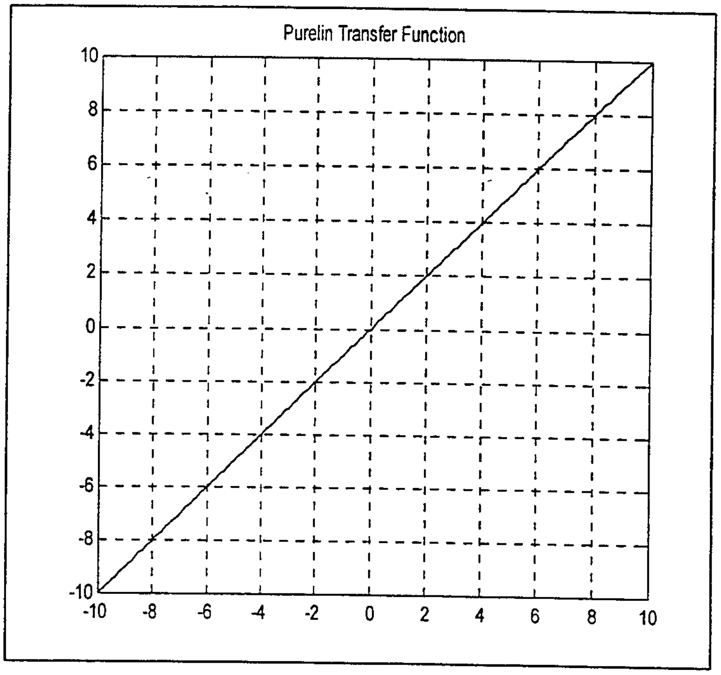


Figure 8.4. Linear Transfer Function

outputs since their range is similar to the range of the training and testing date set except for the fact that the configurations are different. Simulations 8, 18, 28, 38, 48, 58, 68 and 78 from Appendix N and the code used to simulate the missile trajectory are shown in Appendix O.

The results are presented in two graphs. The first graph (Figure 8.21) is the captive-carry seeker inputs to the NN. The second graph presents the captive-carry trajectory, the neural network prediction, the actual missile trajectory associated with that simulation and the Original Target trajectory. As shown in Figure 8.22, the NN predicts the miss trajectory quite well in the beginning. However, by the down range of 60,000 ft, the prediction tries to track the captive-carry trajectory. In the X-Y plane the NN corrects the prediction back to the missile trajectory. In the Z-direction, the NN outputs are influenced by the differences in altitude between the open-loop (1000 ft.) and closed-loop experiments (sea-skimming). The NN prediction starts to follow the captive-carry altitude values. Since the closed and open-loop simulation frame times are different in function from the threat velocities, only 97.22 % of the captive-carry data set was used in order to put the results on a same scale to allow comparisons between them. Only about 84 data points (2.78 %) of the captive-carry experiment was not used by the NN to calculate the missile trajectory prediction. Each simulation generates about 3052 points.

Finally, Table 8.2 presents the comparison between the missile and the predicted miss distance from the captive-carry experiment. The results are very impressive considering that they were obtained from the captive-carry experiment seeker responses and, only because the aircraft altitude is strongly out of the missile altitude, more accurate results could not be obtained. For further improvements in the NN, the possibility of using feedback NN may result in a better miss distance prediction. For now, it is suggested that the aircraft altitude be simply subtracted from the result of the NN as it is shown in Table 8.2 to get a "corrected" value of the NN altitude. After the new miss distance calculation, it is possible to visualize that the predicted miss distance values range is very close to the ones obtained from the closed-loop experiments.

Simulation Number	Actual Miss Distance (ft)	Predicted Miss Distance (ft)
5	1,086.9	1,568.9
15	1,0868.8	1,566.5
25	1,088	1,5650
35	1,086.8	1,581.5
45	1,094.6	1,526.6
55	1,098.6	1,723
65	1,086.9	1,566.6
75	1,086.5	1,574.1

Table 8.1. Miss Distance Comparison Between The Actual Threat And The NN Prediction Using Closed-Loop Experiment Information

Simulation Number	Actual Miss Distance (ft)	Predicted Miss Distance (ft) ("Corrected")
8	1,086.9	2,019.2
18	1,087	2,019.2
28	1,086.4	2,019
38	1,086.8	2,019.3
48	1,052	2,023.8
58	1,051.2	2.020
68	1,086.5	2,019.2
78	1,086	2,019.2

Table 8.2. Miss Distance Comparison Between The Actual Threat And The NN Prediction Using Open-Loop Experiment Information

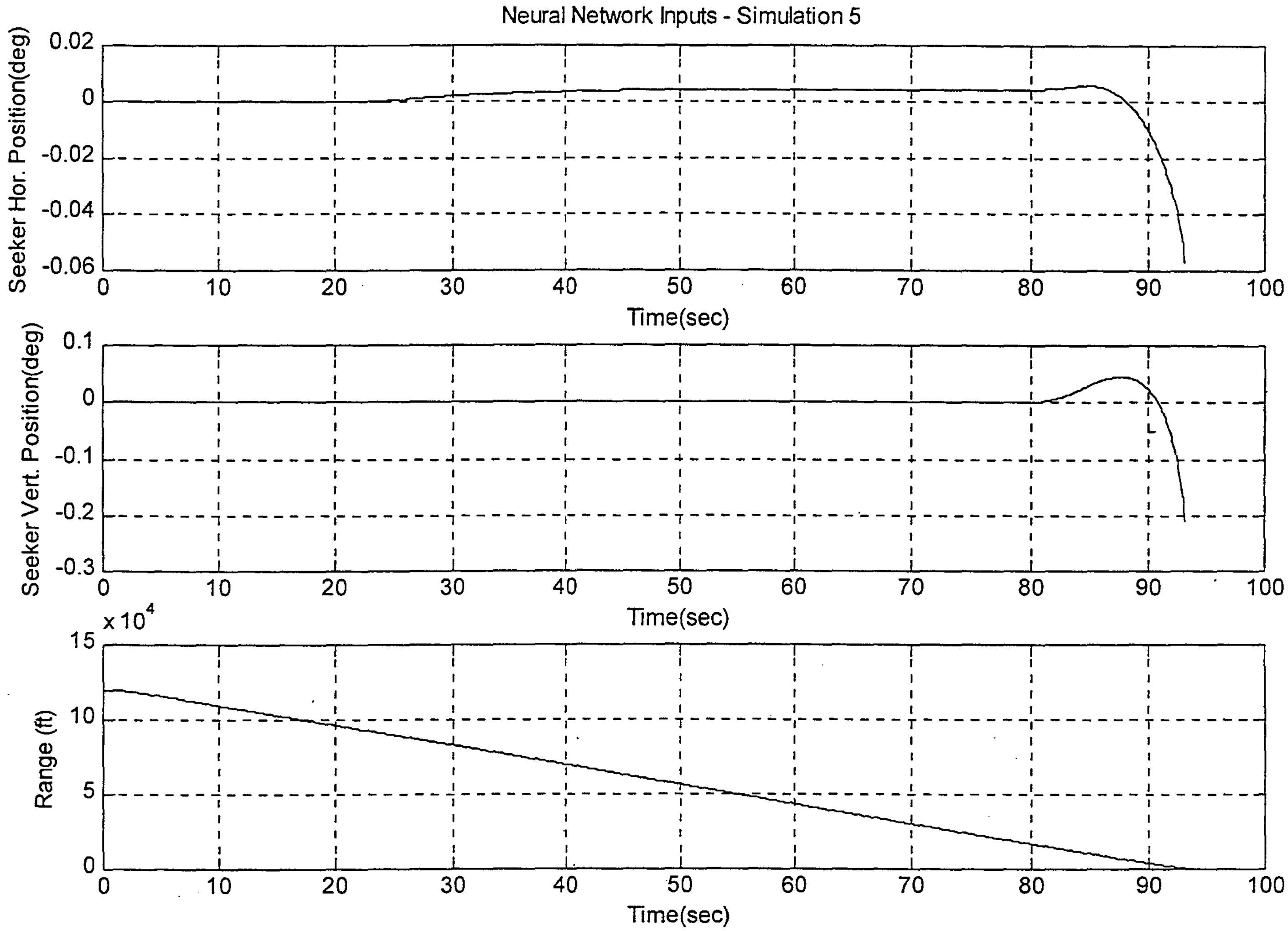


Figure 8.5. Seeker Inputs for the Neural Network (Simulation 5)

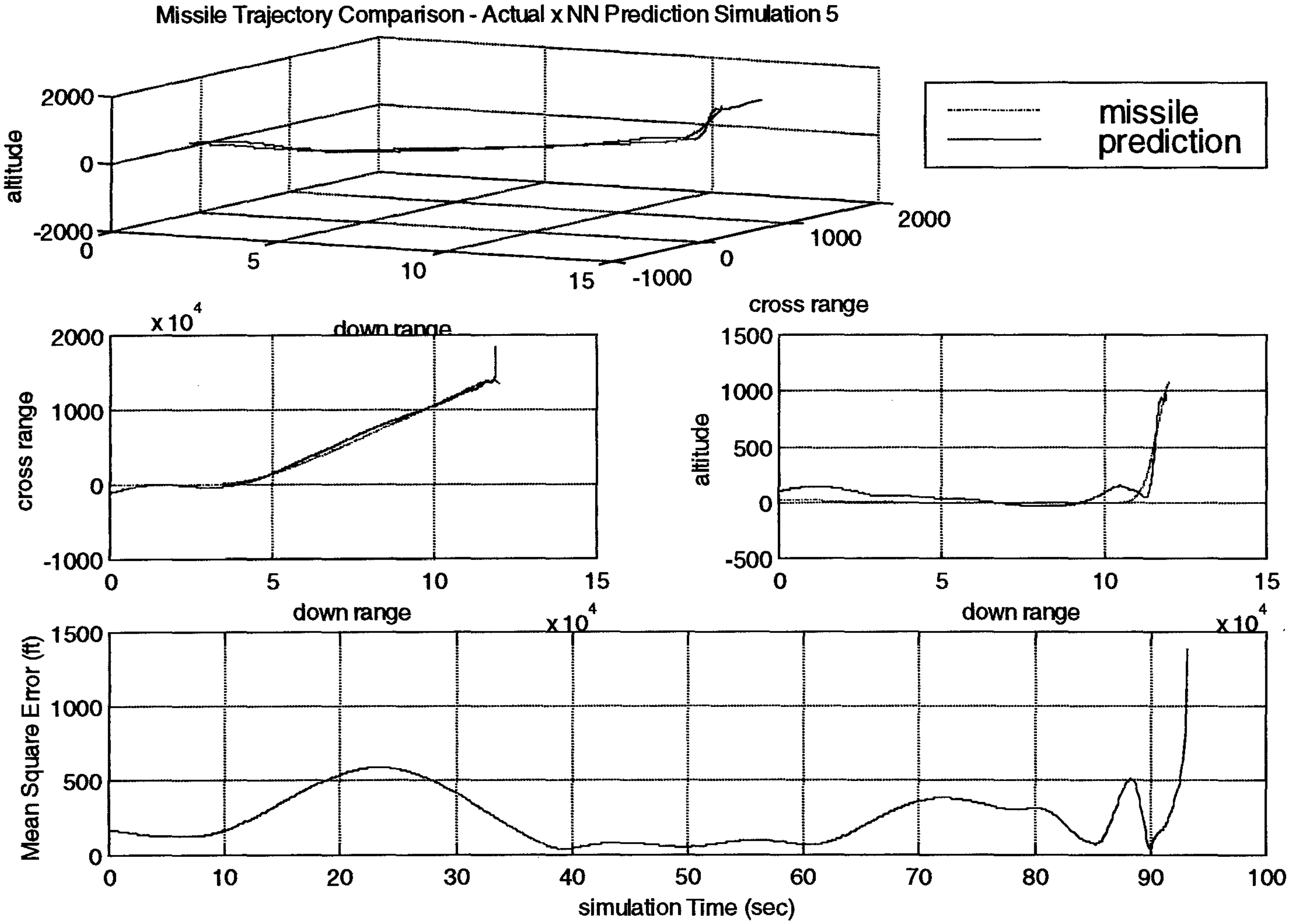


Figure 8.6. Missile Trajectory Comparison – Actual x NN Prediction-Simulation 5

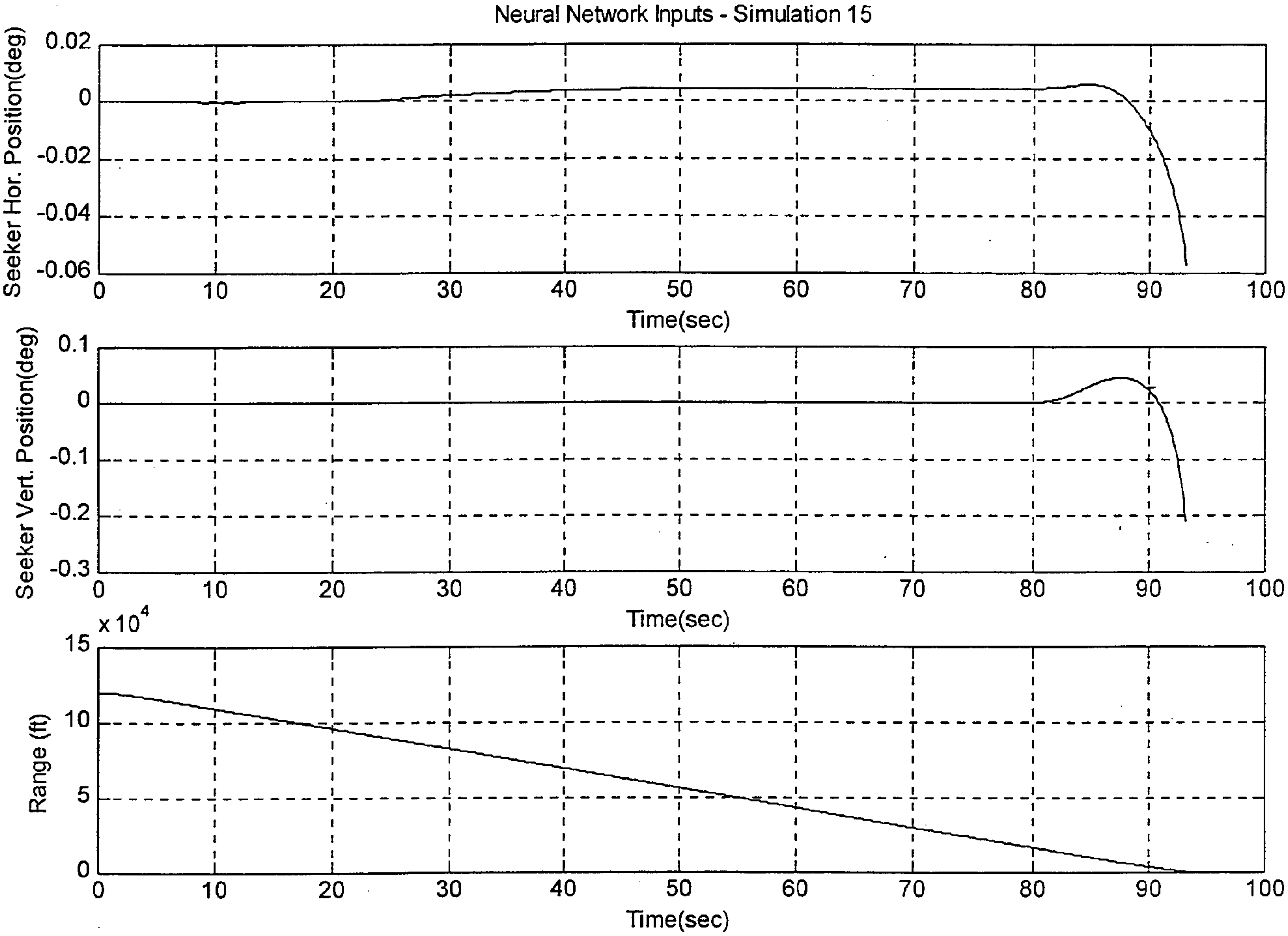


Figure 8.7. Seeker Inputs for the Neural Network (Simulation 15)

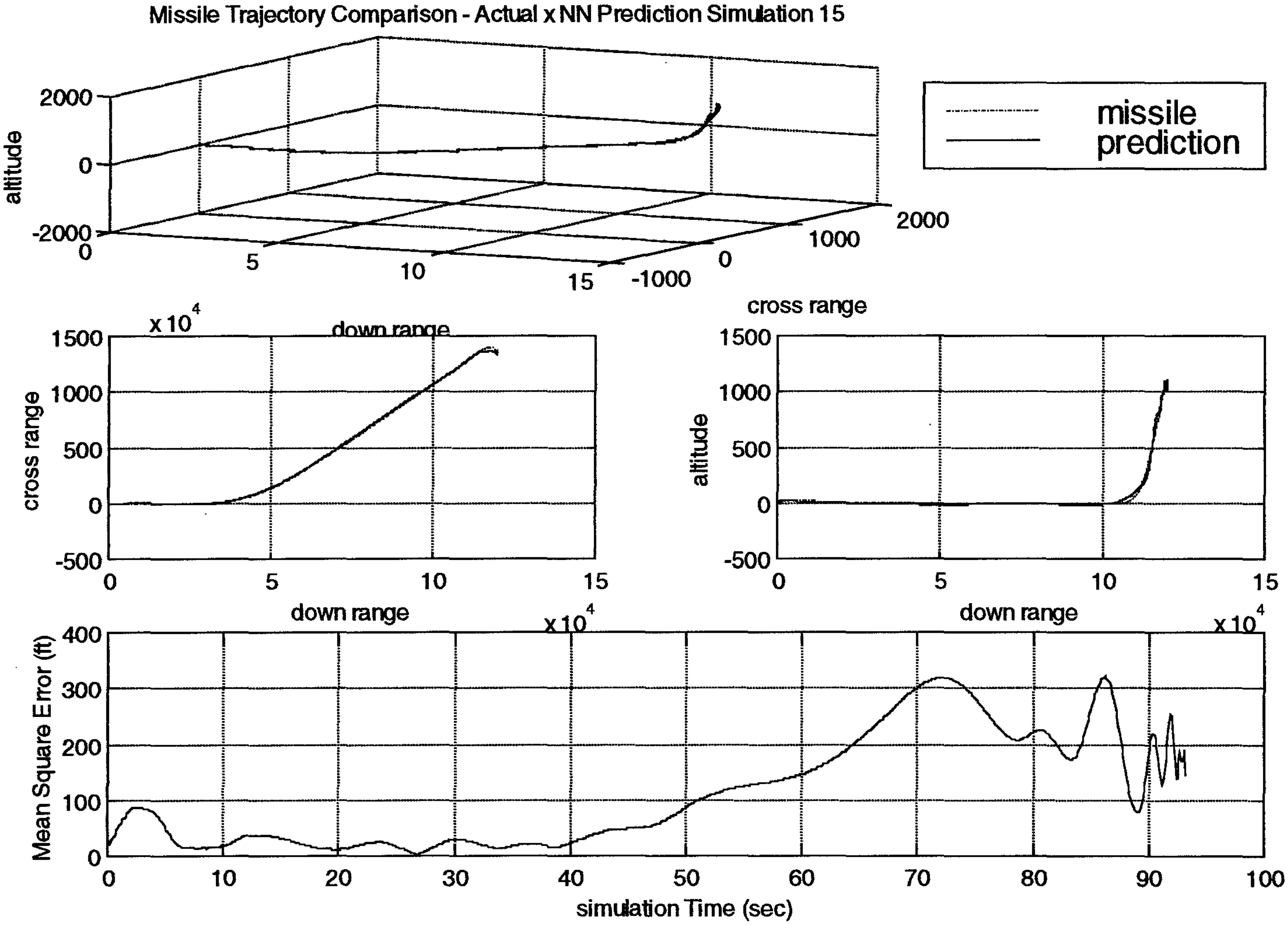


Figure 8.8. Missile Trajectory Comparison – Actual x NN Prediction-Simulation 15

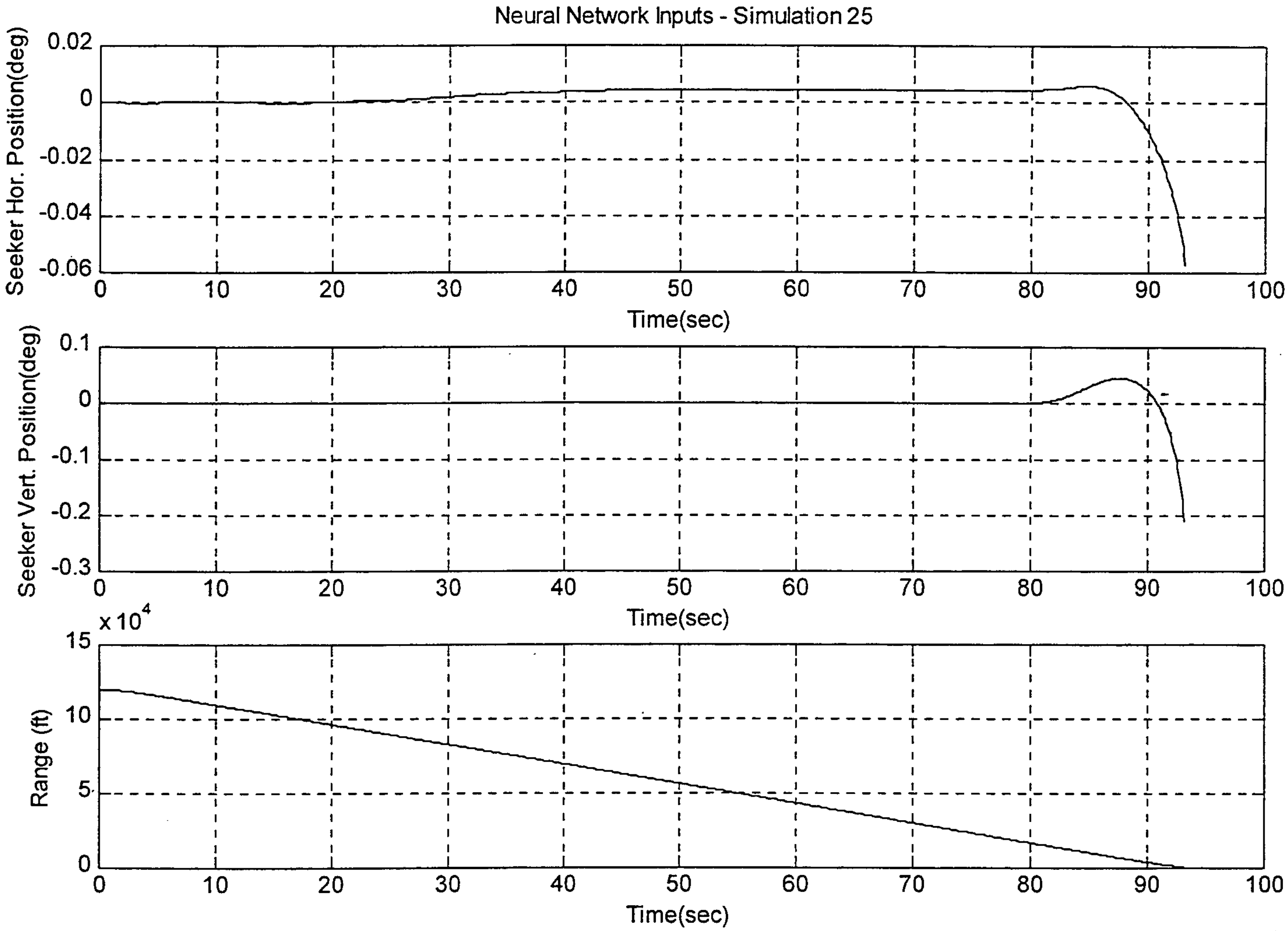


Figure 8.9. Seeker Inputs for the Neural Network (Simulation 25)

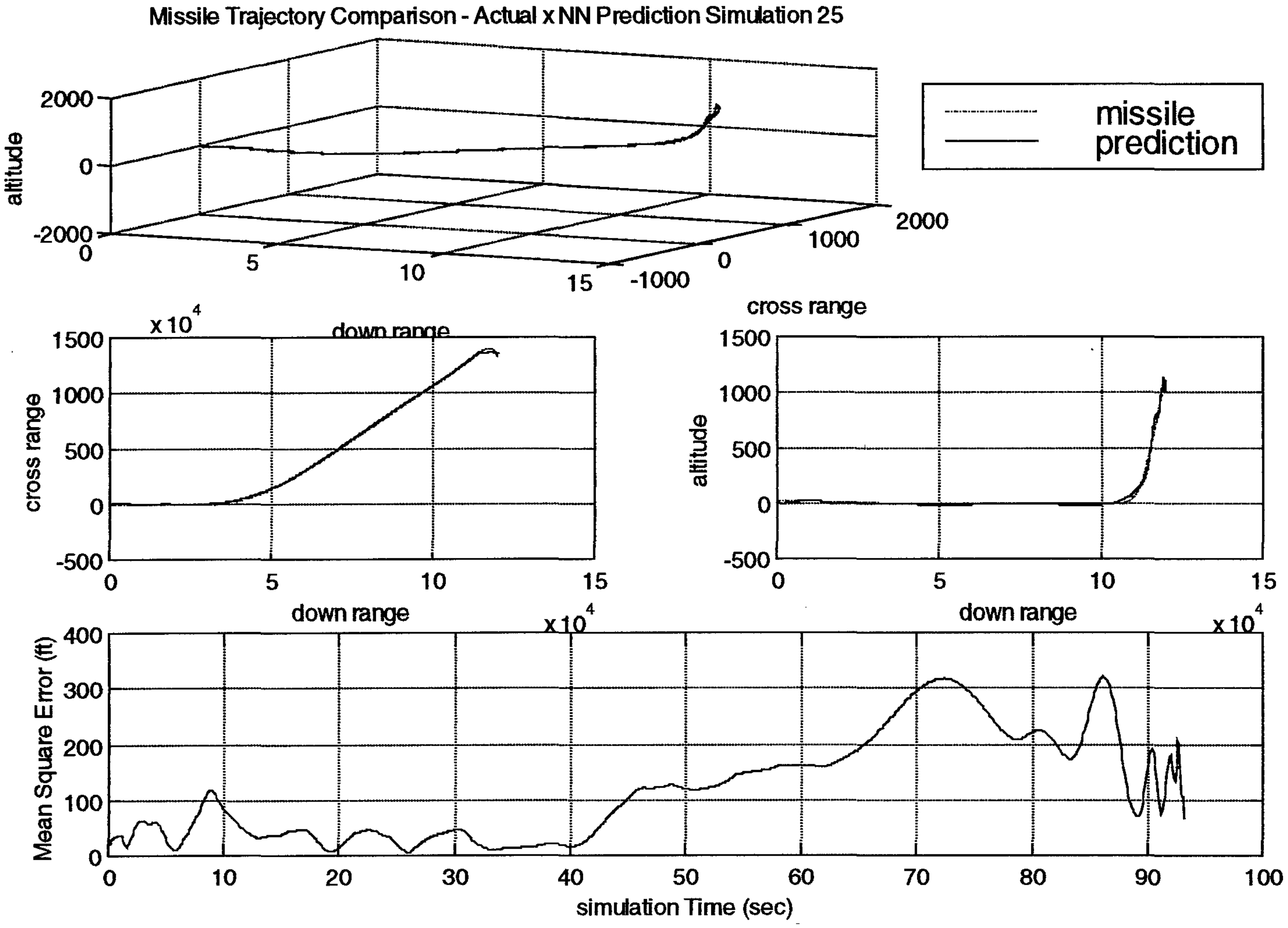


Figure 8.10. Missile Trajectory Comparison – Actual x NN Prediction-Simulation 25

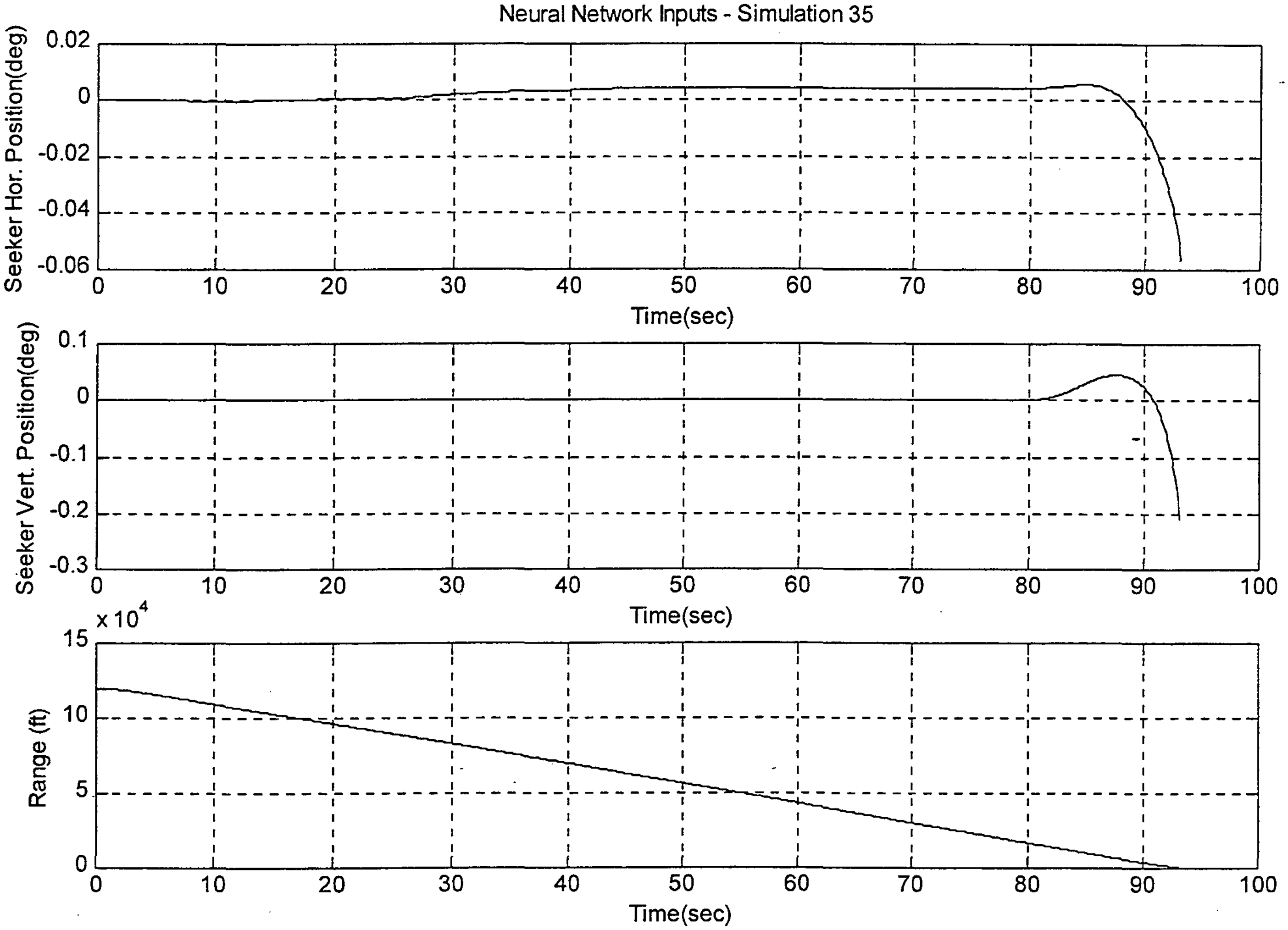


Figure 8.11. Seeker Inputs for the Neural Network (Simulation 35)

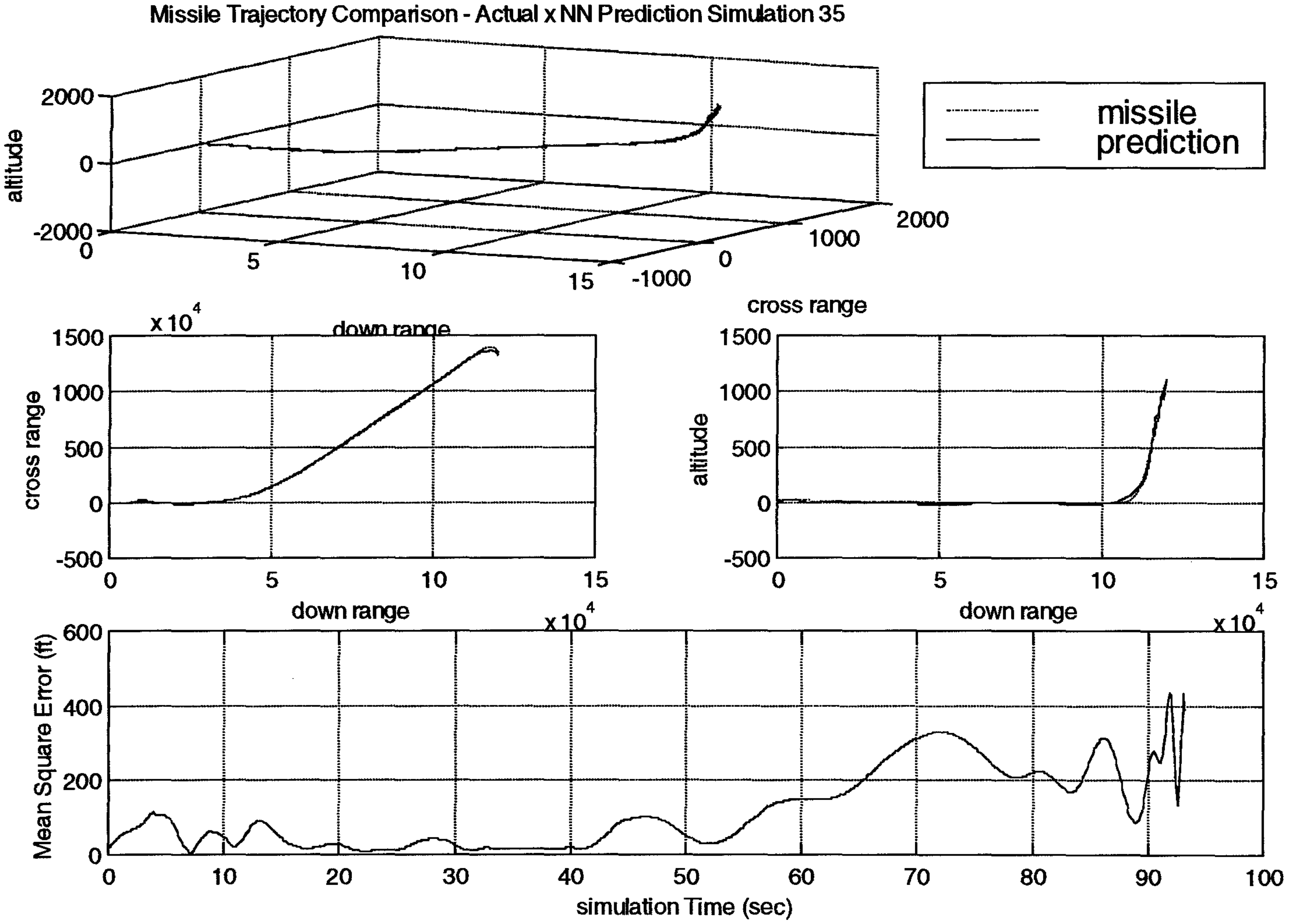


Figure 8.12. Missile Trajectory Comparison – Actual x NN Prediction-Simulation 35

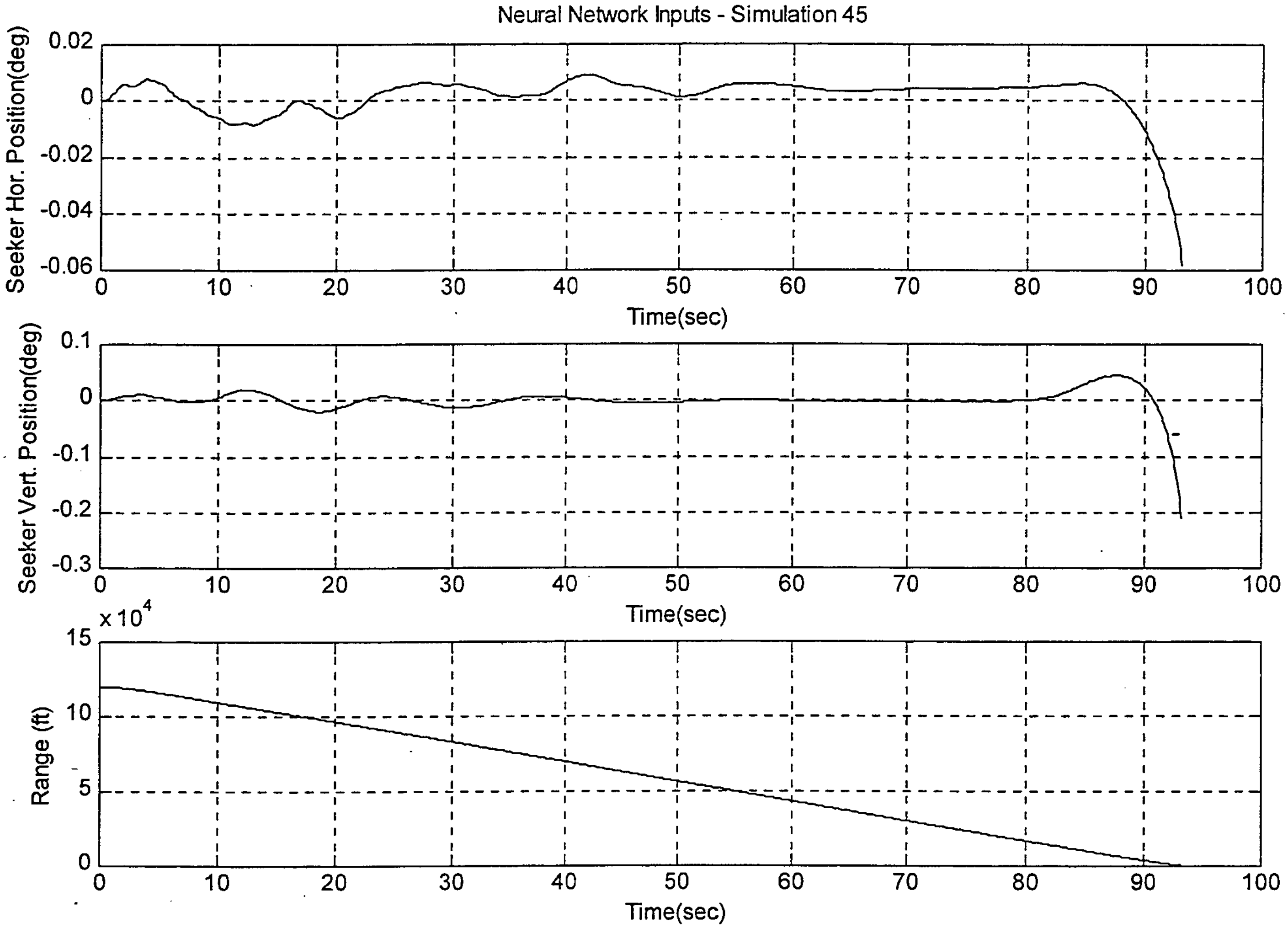


Figure 8.13. Seeker Inputs for the Neural Network (Simulation 45)

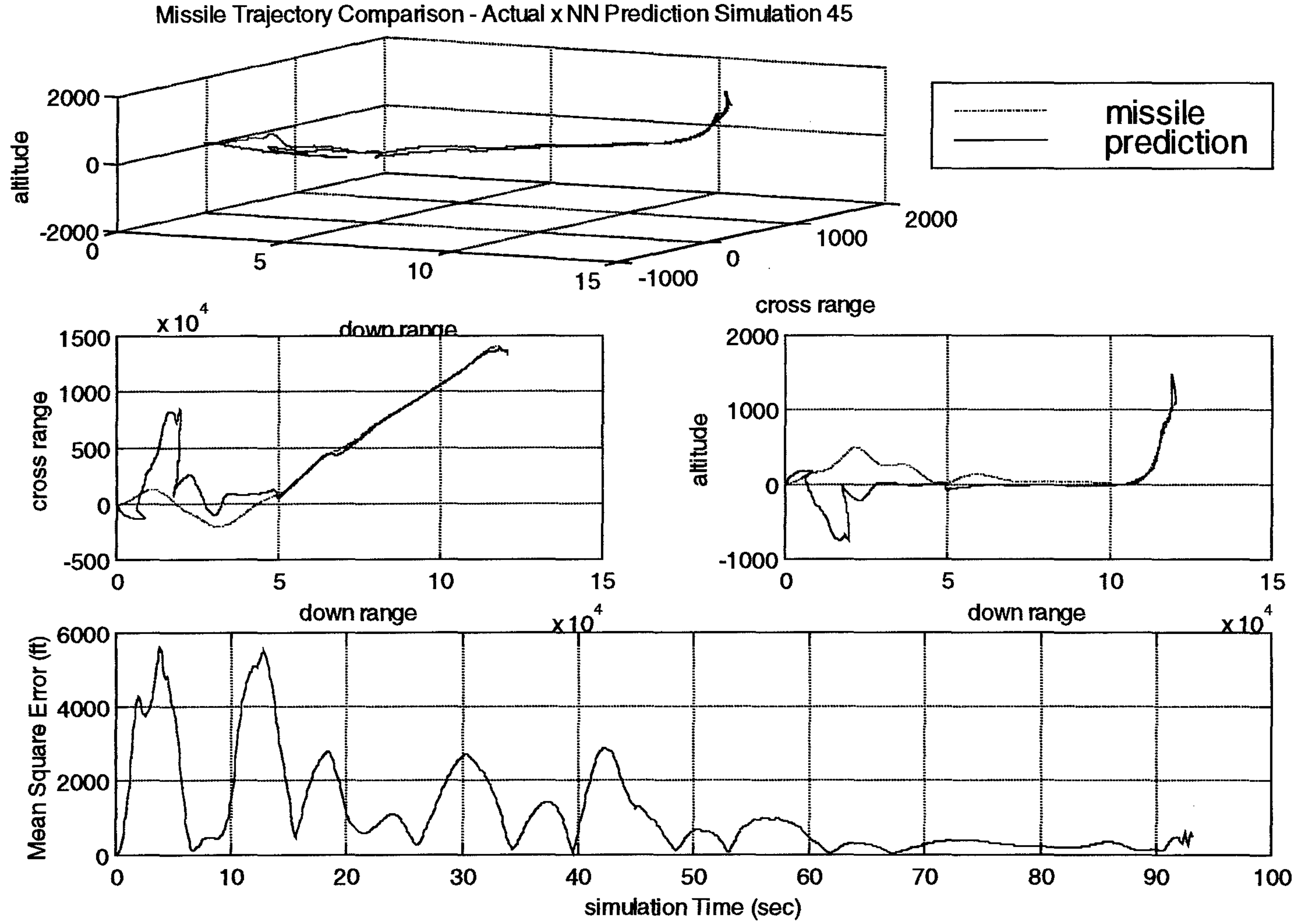


Figure 8.14. Missile Trajectory Comparison – Actual x NN Prediction-Simulation 45

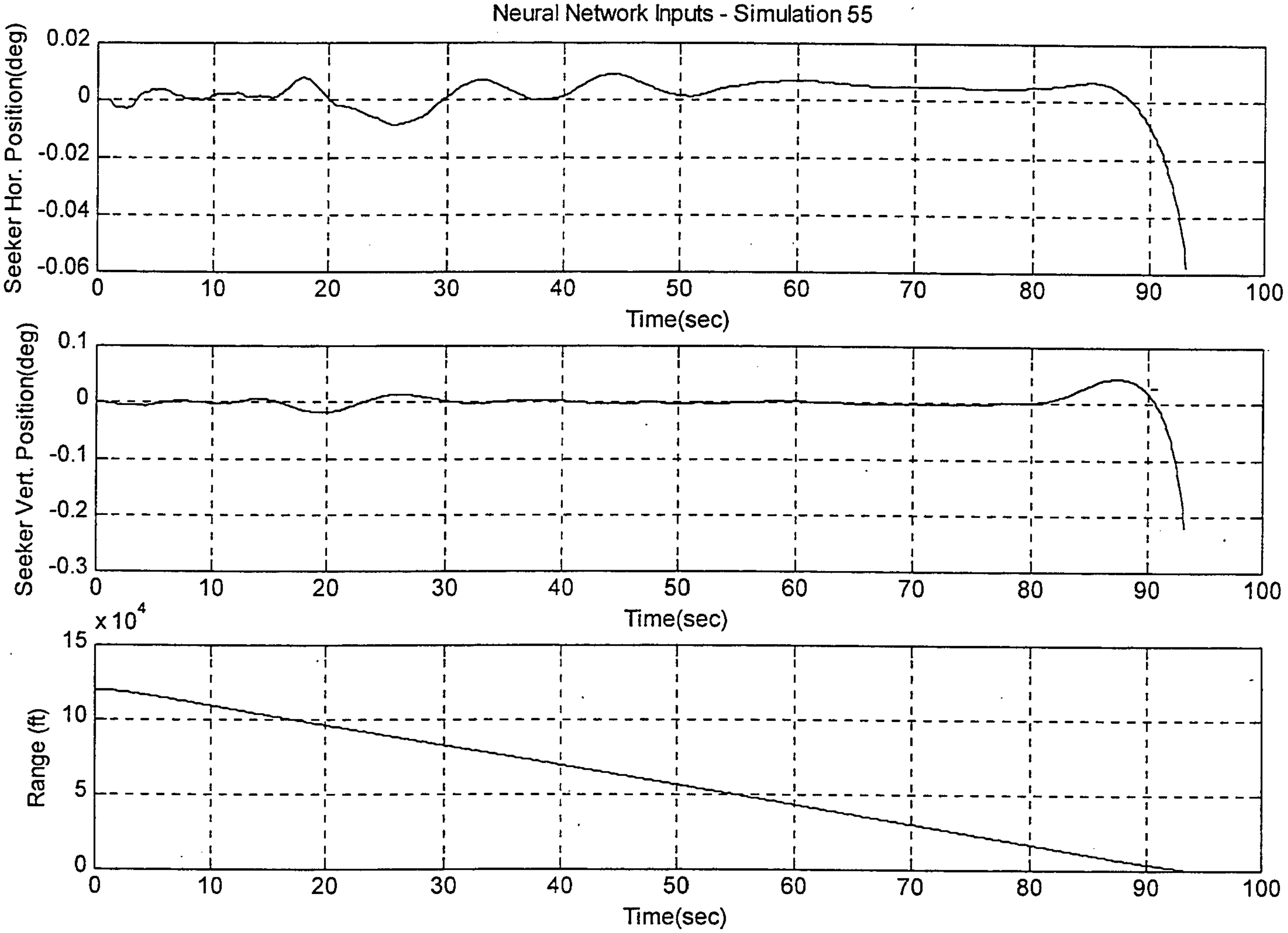


Figure 8.15. Seeker Inputs for the Neural Network (Simulation 55)

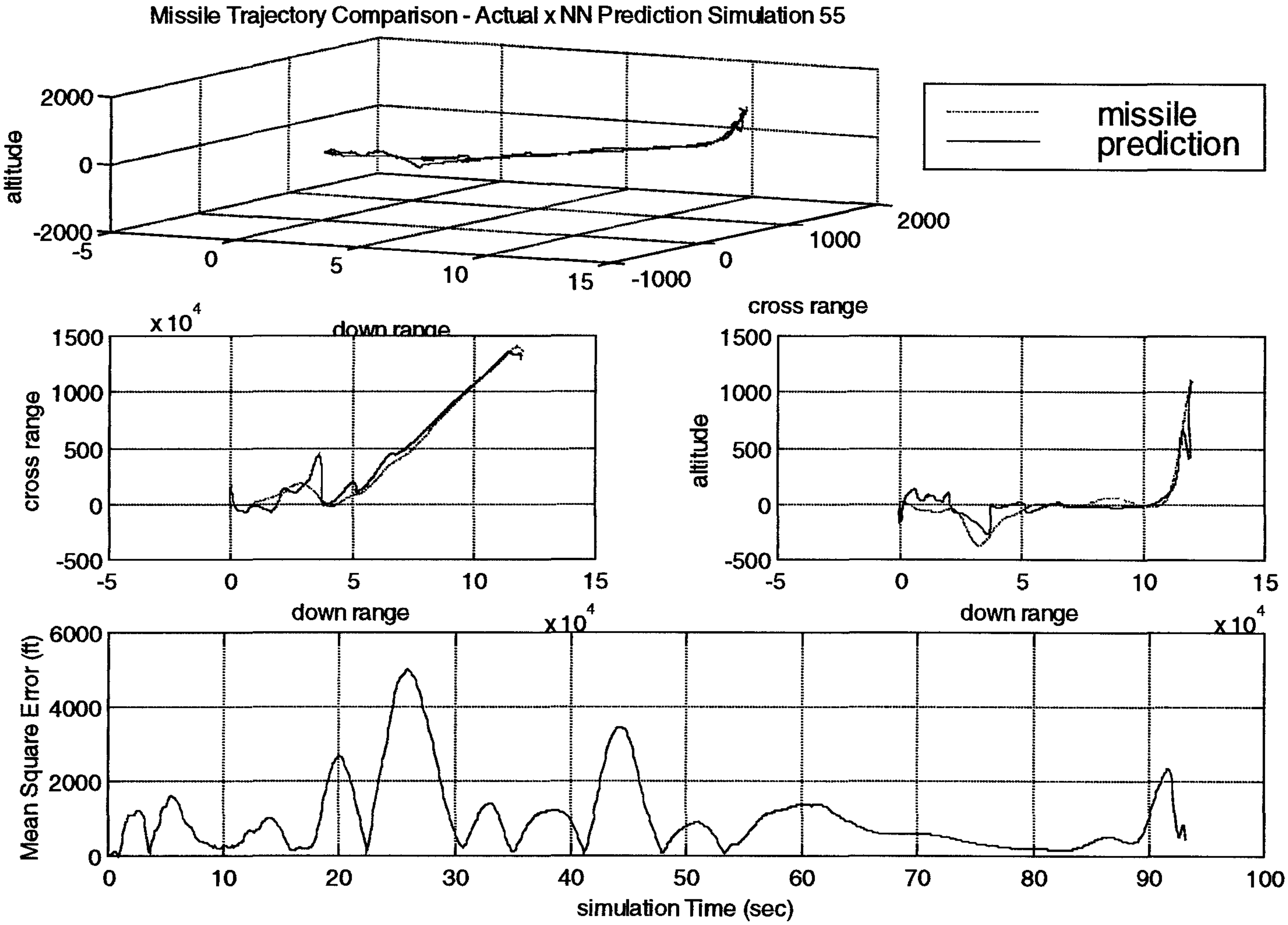


Figure 8.16. Missile Trajectory Comparison – Actual x NN Prediction-Simulation 55

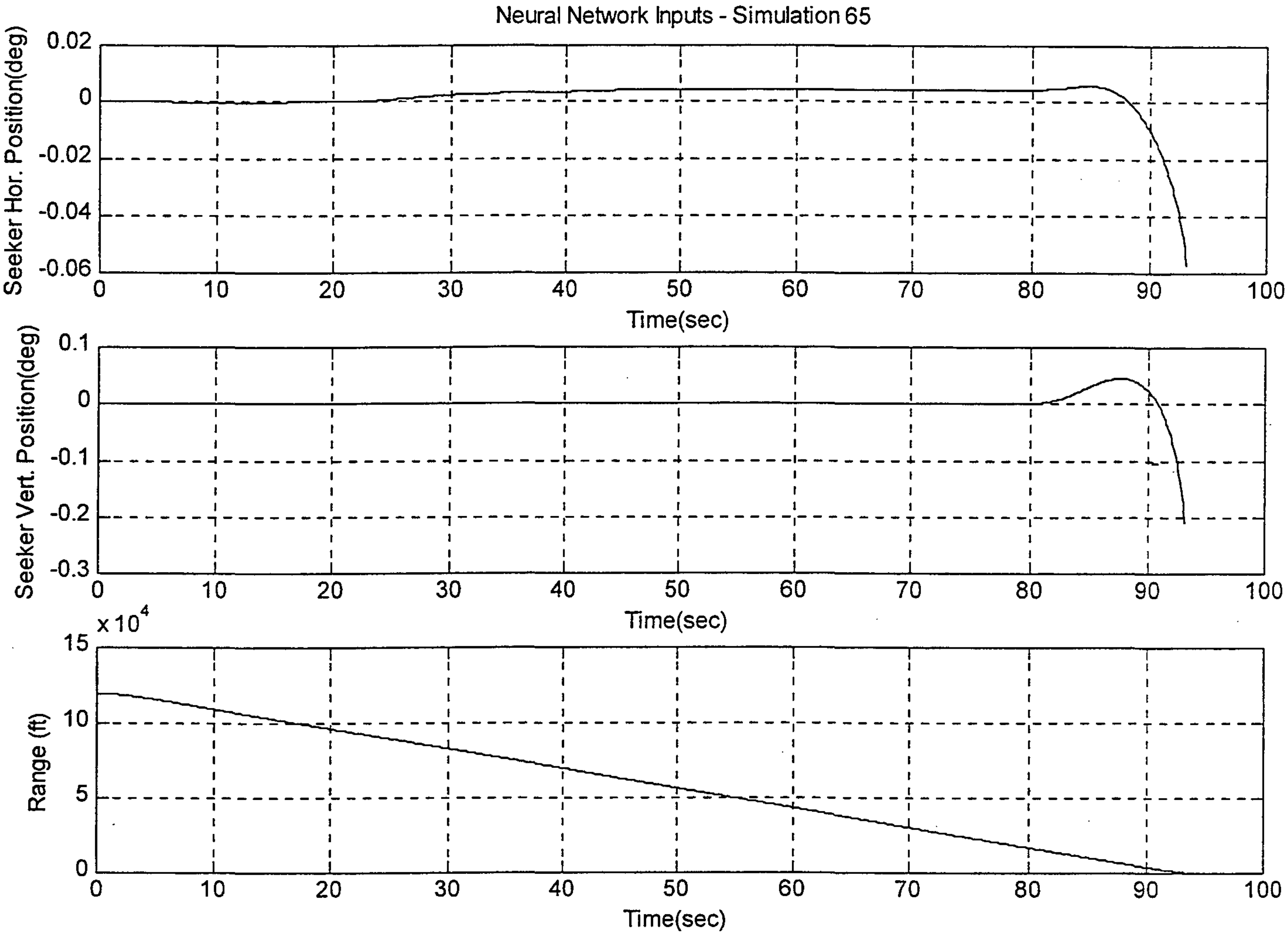


Figure 8.17. Seeker Inputs for the Neural Network (Simulation 65)

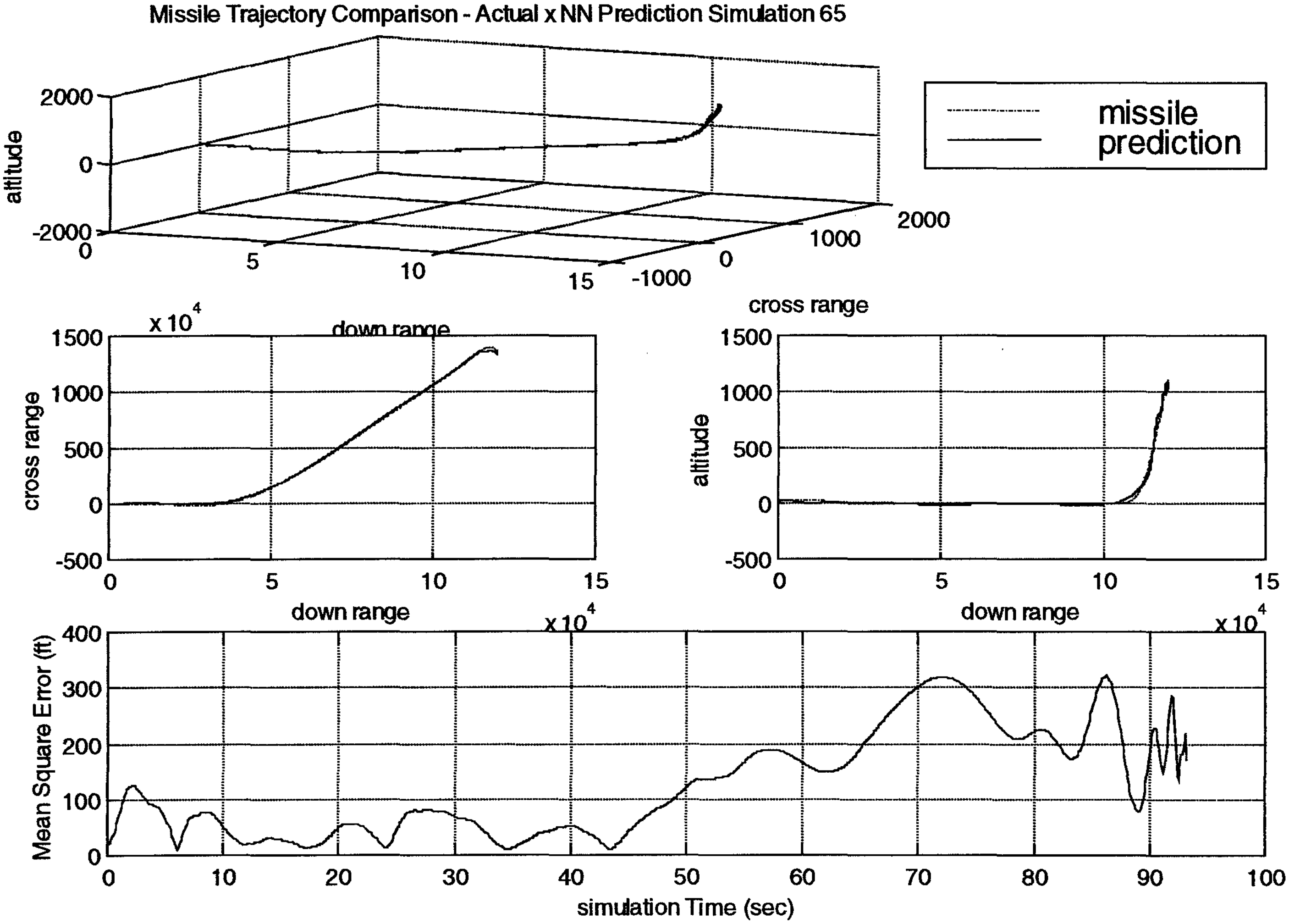


Figure 8.18. Missile Trajectory Comparison – Actual x NN Prediction-Simulation 65

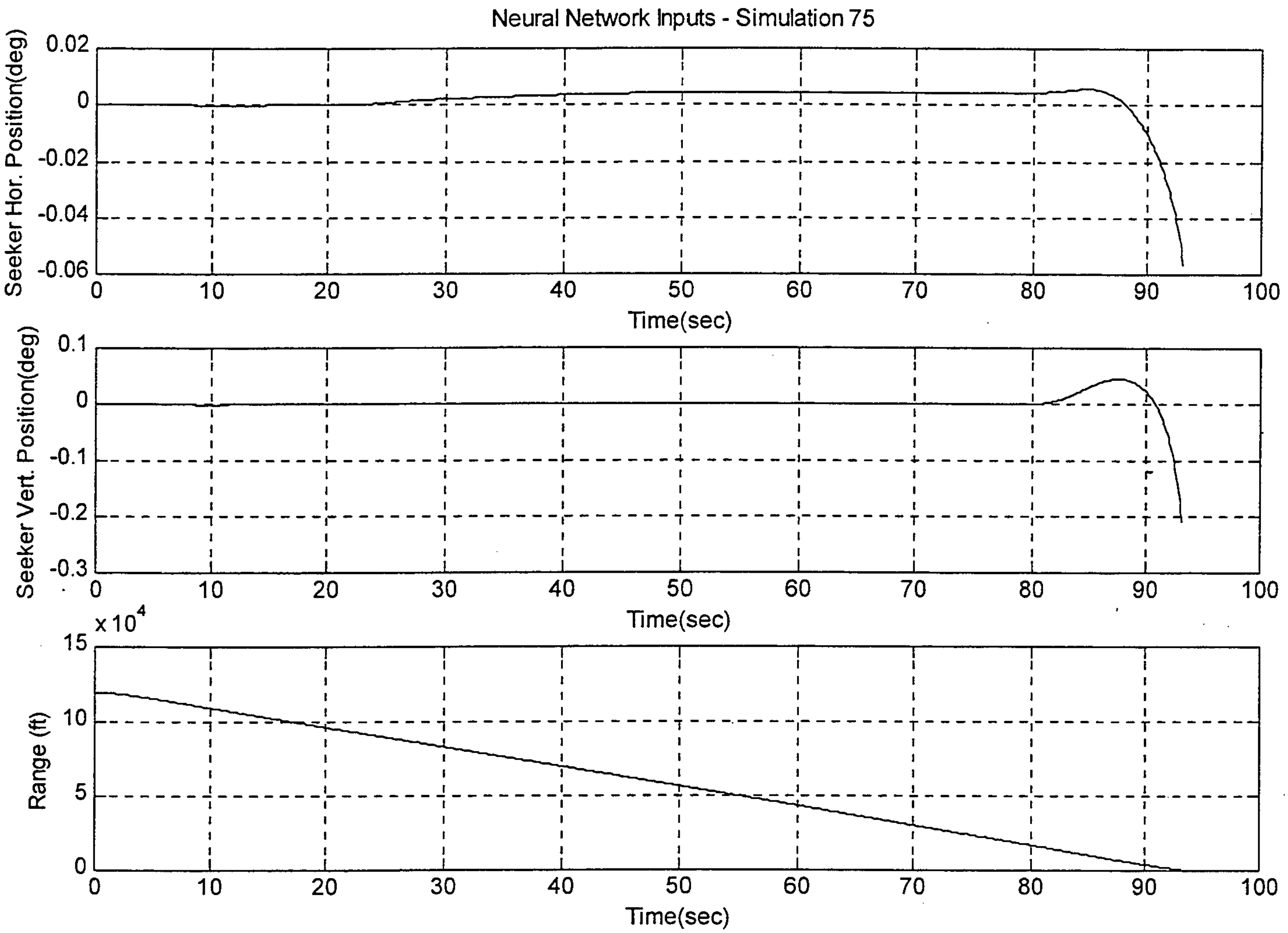


Figure 8.19. Seeker Inputs for the Neural Network (Simulation 75)

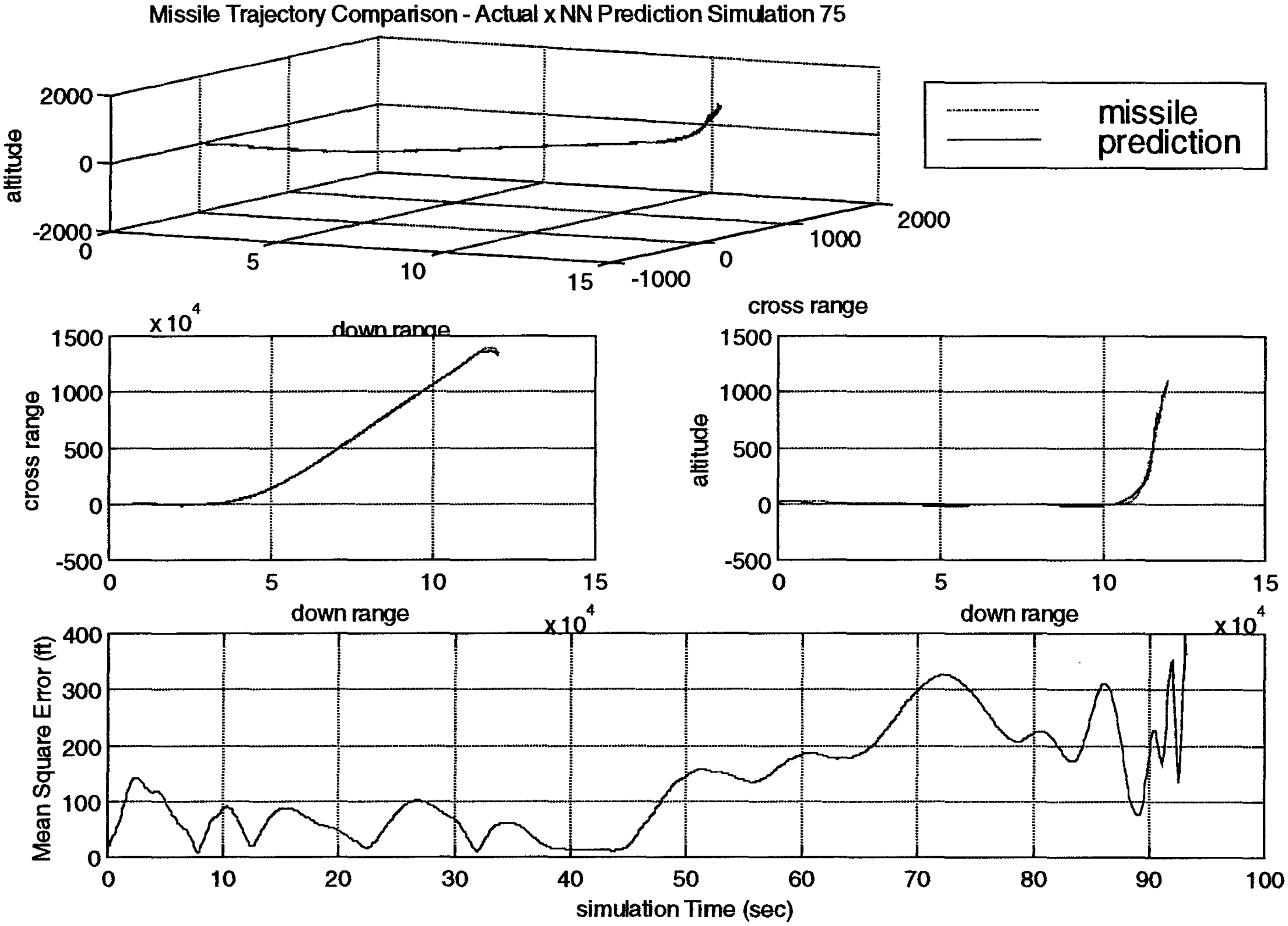


Figure 8.20. Missile Trajectory Comparison – Actual x NN Prediction-Simulation 75

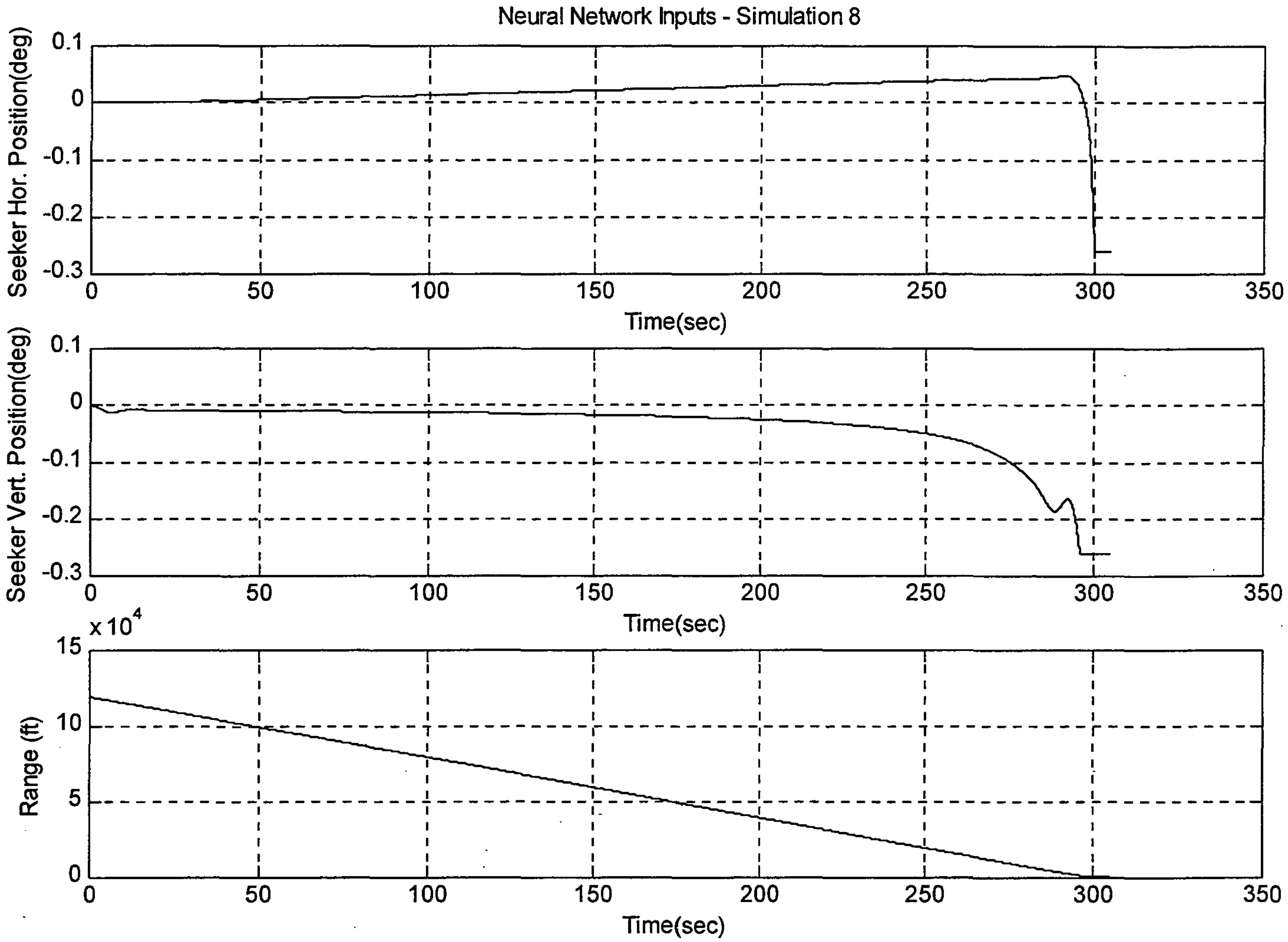


Figure 8.21. Seeker Inputs for the Neural Network (Simulation 8)

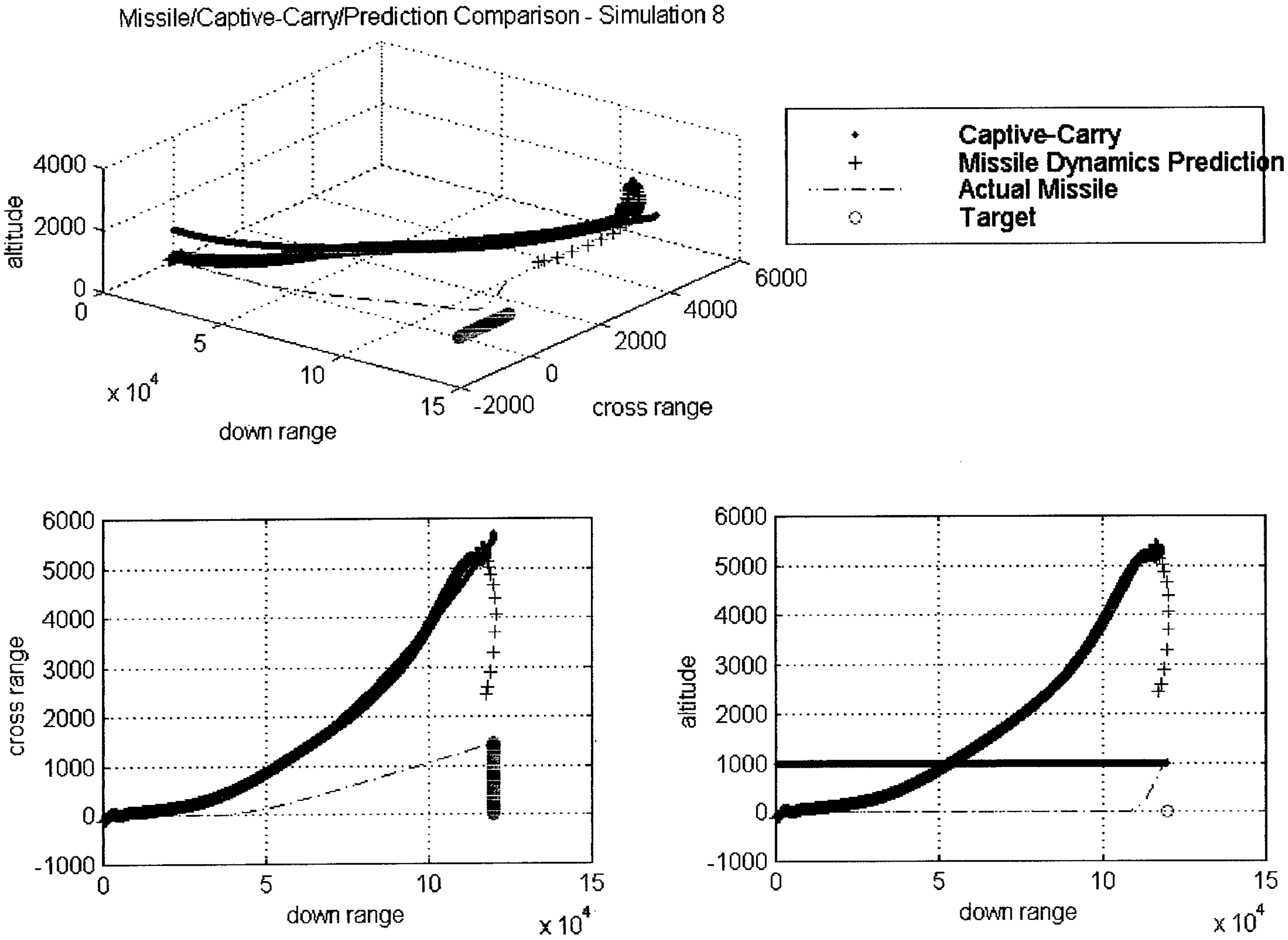


Figure 8.22. Missile/Captive-Carry Prediction Comparison – Simulation 8

IX. CONCLUSIONS

The computer modeling of the captive-carry (open-loop) and missile (closed-loop) simulations using the ASCM Digital Model and the GUI *Menu* allow us to get cost-effective information about the hardware-in-the-loop (HIL) experiments. The model testing also aids in the different approachs for manipulating the data gathered from the experiments in order to predict the electronic attack (EA) measurement of effectiveness from the open-loop simulation.

This thesis produced a comprehensive model description and parameter influence analysis in the missile trajectory. Depending on the information about real ASCMs, the analysis allows us to modify the model parameters or to make model improvements that behave similarly to a real threat. After updating the model for a specific threat, it is possible to study the missile trajectory for the new configuration in order to maximize the effectiveness of the selected EA and, consequently, to increase the miss distance.

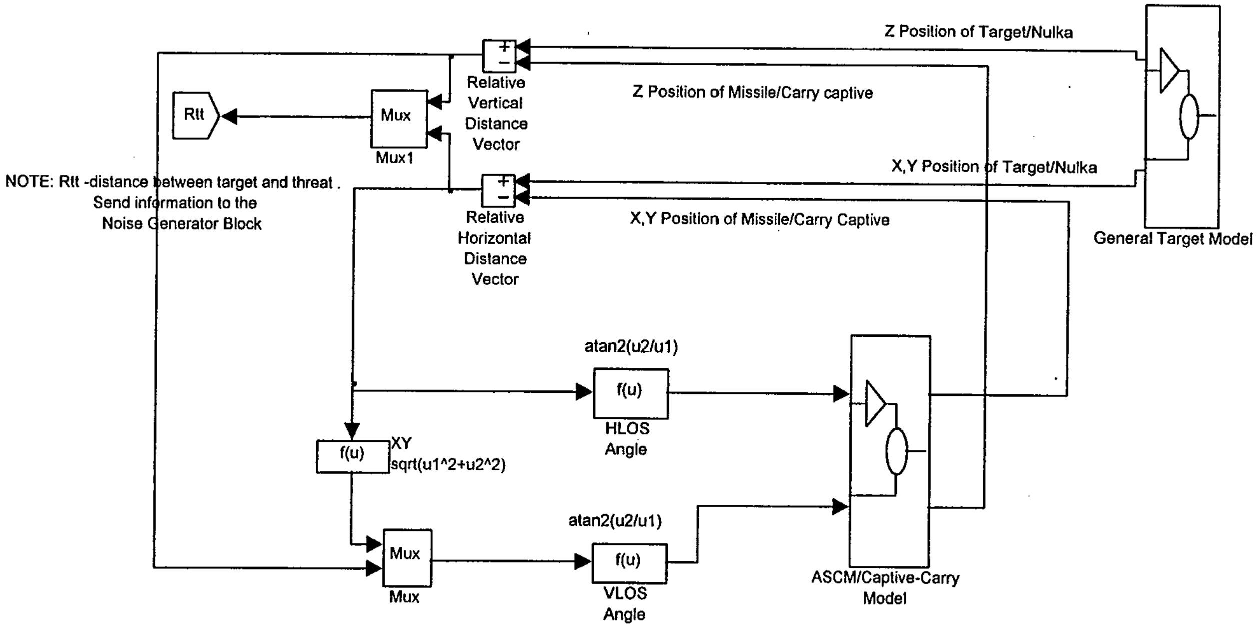
The seeker signal comparisons of the two computer modeling experiments allowed us to conclude that it is feasible to research combining the best results of each computer experiment, i.e., the missile dynamics available in the closed-experiment and the seeker signals in the collision triangle in the open-loop experiment.

Also, in this thesis, it was possible to create an algorithm using a neural network to make a prediction of the missile trajectory and its associated miss distance with and without the presence of the Nulka decoy (EA) using the information of the computer captive-carry experiment.

Finally, for further improvements, it is suggested that several target and aircraft profiles (course and velocities) be added in order to observe the results obtained in this thesis in any desired direction. Also, it is suggested that new shipboard countermeasures be included in order to compare the effectiveness of each one using the miss distance parameter. The ASCM model can receive different new sub-systems, for instance, a different seeker model in order to compare its performance with the ones already present in the model, or an autopilot, or new missile dynamics configuration. As said before, the rationale of this computer model is to obtain cost-effective information to improve the already existing HIL technology. The suggestions presented above are made in order to make our computer model more flexible and realistic.

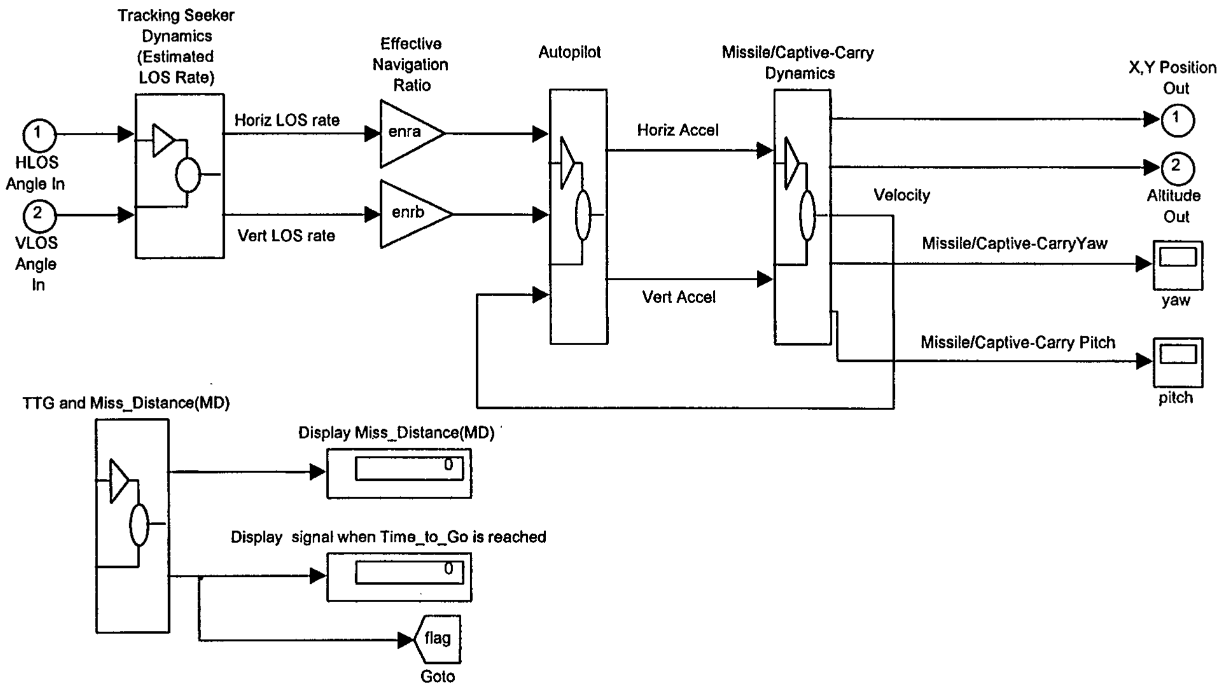
APPENDIX A. ASCM DIGITAL MODEL

ASCM DIGITAL MODEL

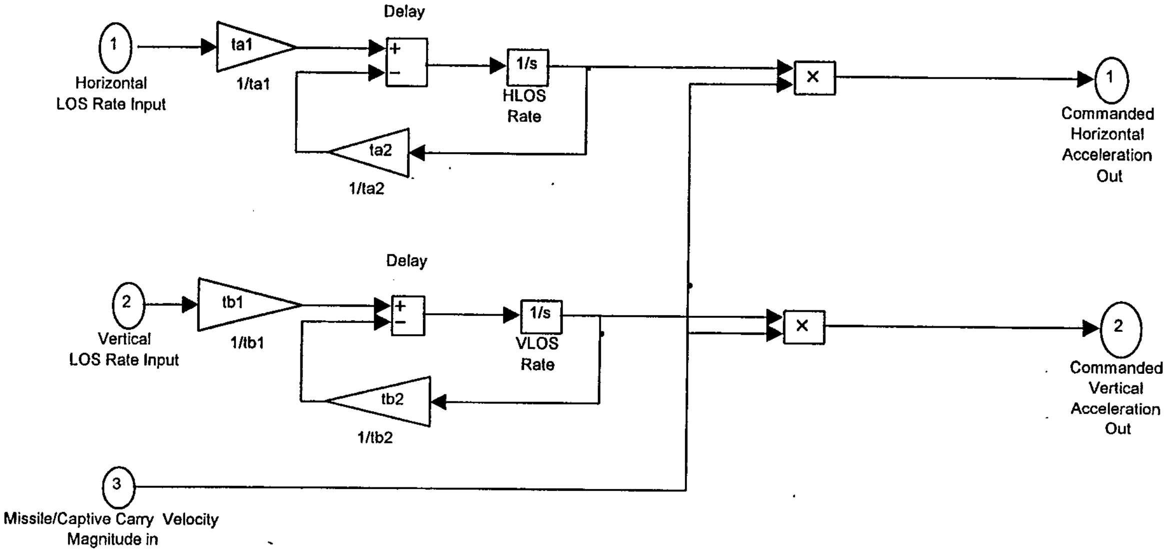


NOTE: Rtt -distance between target and threat .
Send information to the
Noise Generator Block

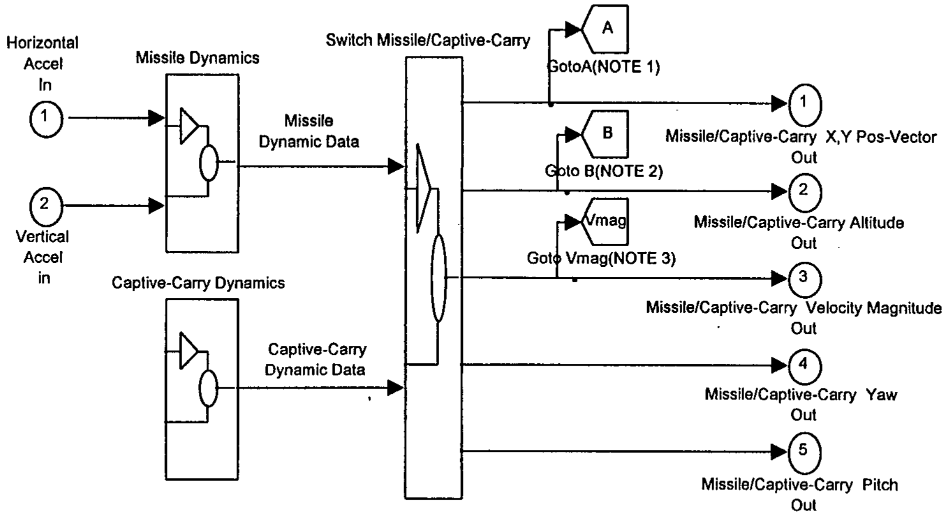
ASCM/Captive-Carry Model


Tracking Seeker Dynamics (Estimated LOS Rate)
1
HLOS Angle In
2
VLOS Angle In
Horiz LOS rate
Vert LOS rate
Effective Navigation Ratio
enra
enrb
Autopilot
Horiz Accel
Vert Accel
Missile/Captive-Carry Dynamics
Velocity
X,Y Position Out
1
2
Altitude Out
Missile/Captive-CarryYaw
yaw
Missile/Captive-Carry Pitch
pitch
TTG and Miss_Distance(MD)
Display Miss_Distance(MD)
0
Display signal when Time_to_Go is reached
0
flag
Goto

AutoPilot


Delay
1
Horizontal LOS Rate Input
ta1
1/ta1
+
−
1/s
HLOS Rate
ta2
1/ta2
×
1
Commanded Horizontal Acceleration Out
Delay
2
Vertical LOS Rate Input
tb1
1/tb1
+
−
1/s
VLOS Rate
tb2
1/tb2
×
2
Commanded Vertical Acceleration Out
3
Missile/Captive Carry Velocity Magnitude in

Missile/Captive-Carry Dynamics


Horizontal Accel In
1
2
Vertical Accel in
Missile Dynamics
Captive-Carry Dynamics
Missile Dynamic Data
Captive-Carry Dynamic Data
Switch Missile/Captive-Carry
A
GotoA(NOTE 1)
B
Goto B(NOTE 2)
Vmag
Goto Vmag(NOTE 3)
1
Missile/Captive-Carry X,Y Pos-Vector Out
2
Missile/Captive-Carry Altitude Out
3
Missile/Captive-Carry Velocity Magnitude Out
4
Missile/Captive-Carry Yaw Out
5
Missile/Captive-Carry Pitch Out

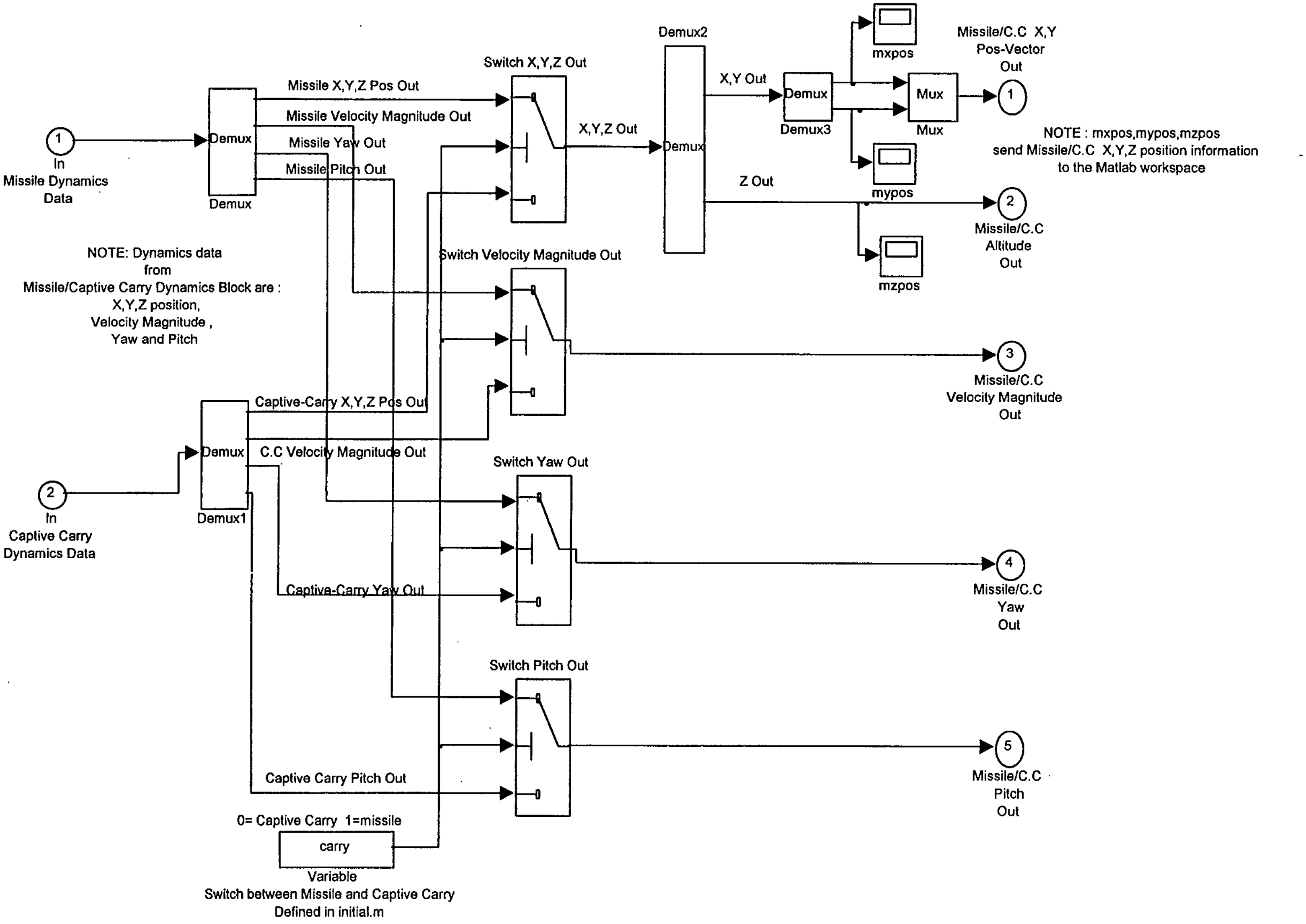
NOTE 1: Goto A (Missile/Captive-Carry X,Y Pos)
send information to the block TTG& MD

NOTE 2: Goto B (Missile/Captive-Carry Altitude)
send information to the block TTG& MD

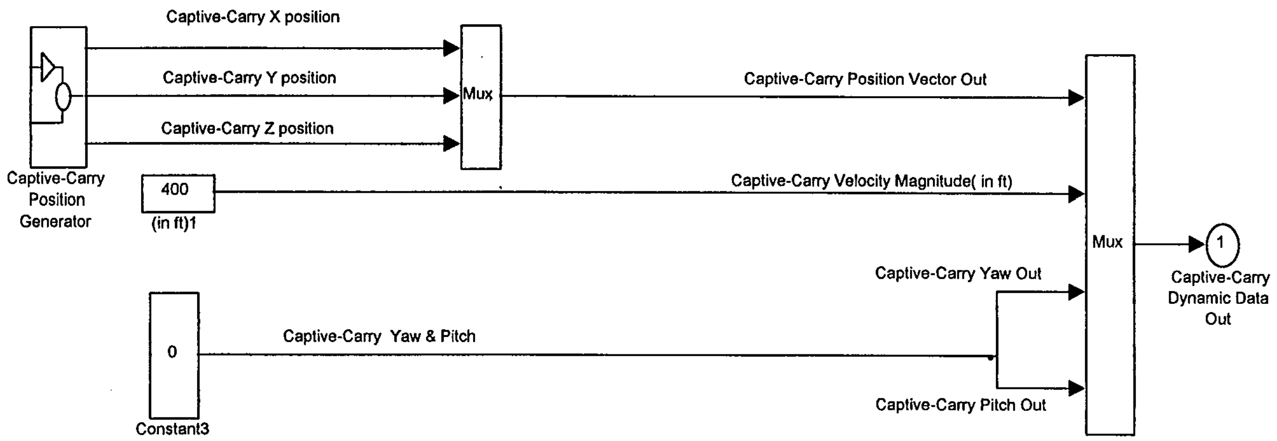
NOTE 3: Goto Vmag (Missile/Captive-Carry Velocity Magnitude)
send information to the block TTG& MD and Autopilot

NOTE 4: Dynamic data are :
X,Y,Z position,
Velocity Magnitude ,
Yaw and Pitch

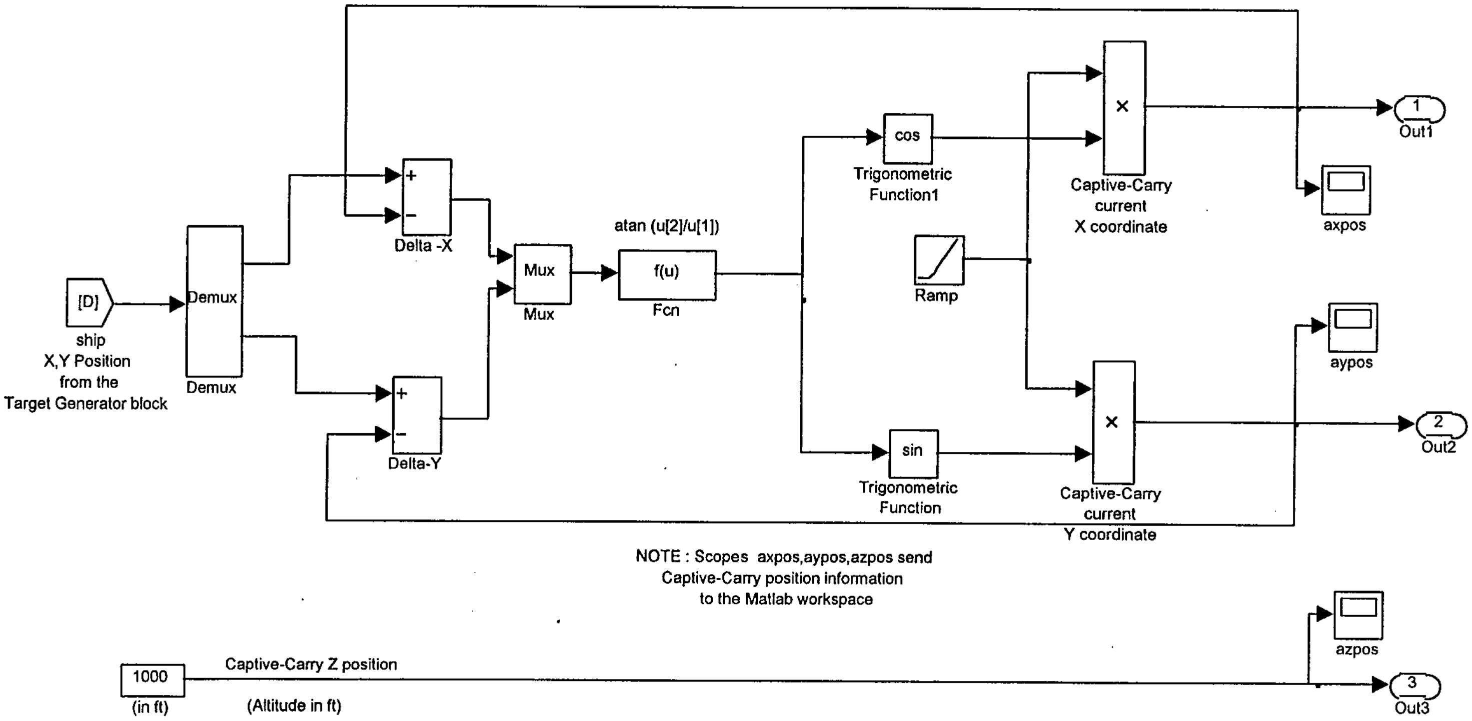
Switch Missile/Captive-Carry



Captive-Carry Dynamics

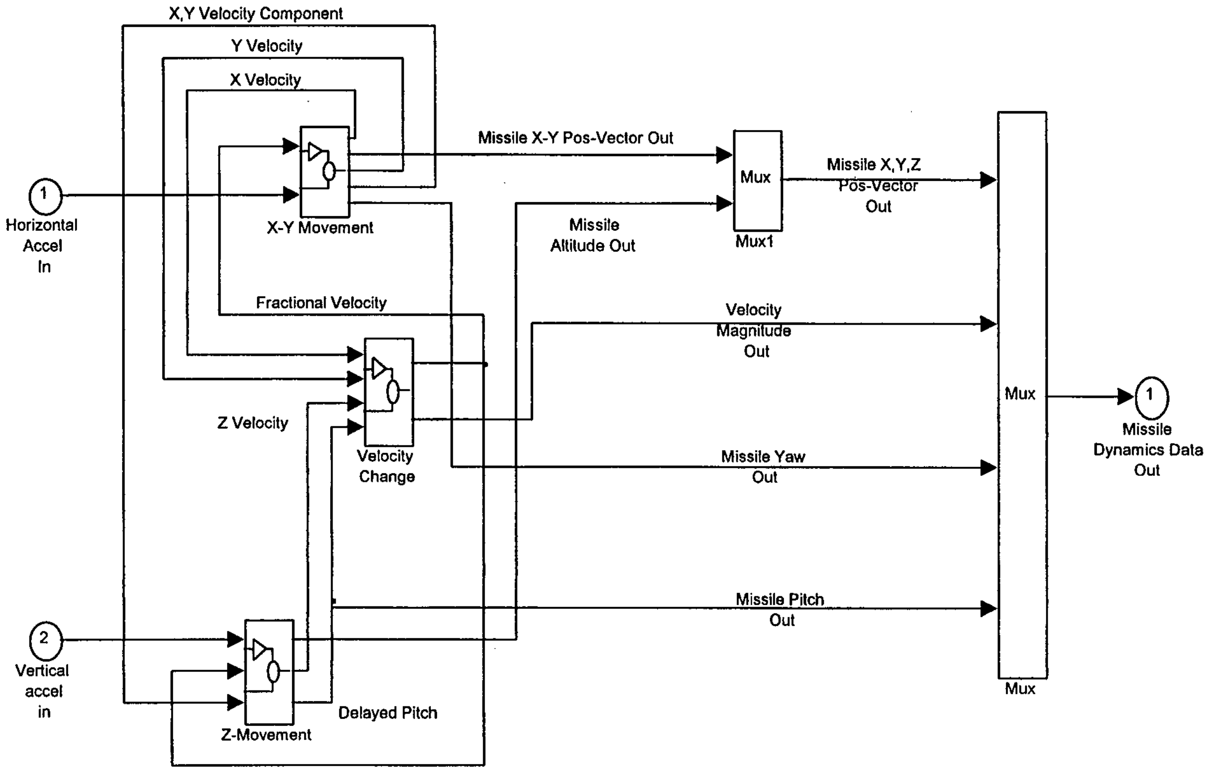

Captive-Carry X position
Captive-Carry Y position
Captive-Carry Z position
Mux
Captive-Carry Position Generator
400
(in ft)1
Captive-Carry Position Vector Out
Captive-Carry Velocity Magnitude(in ft)
0
Constant3
Captive-Carry Yaw & Pitch
Captive-Carry Yaw Out
Captive-Carry Pitch Out
Mux
1
Captive-Carry Dynamic Data Out

Captive-Carry Position Generator

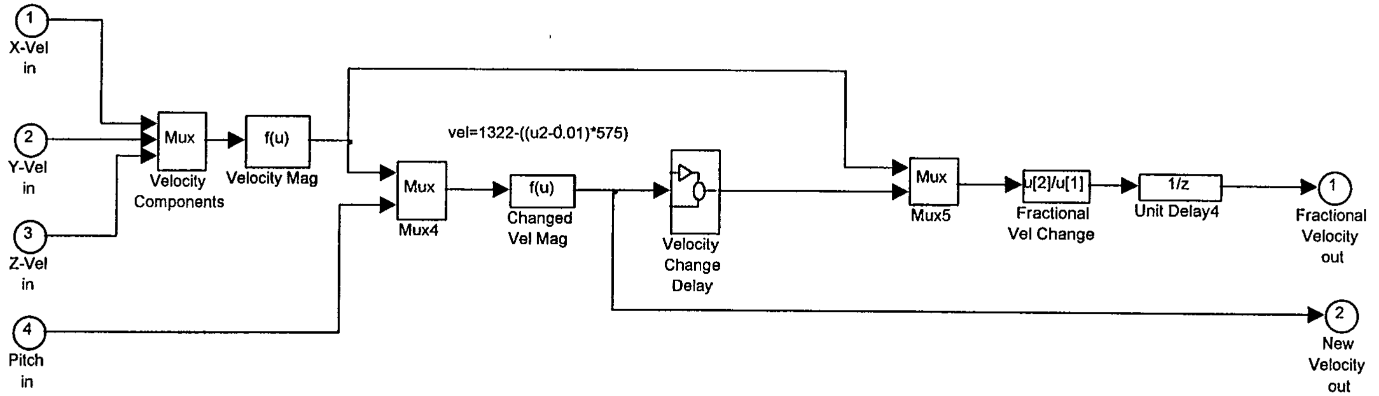


NOTE : Scopes axpos,aypos,azpos send
Captive-Carry position information
to the Matlab workspace

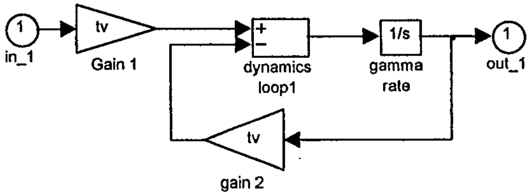
Missile Dynamics



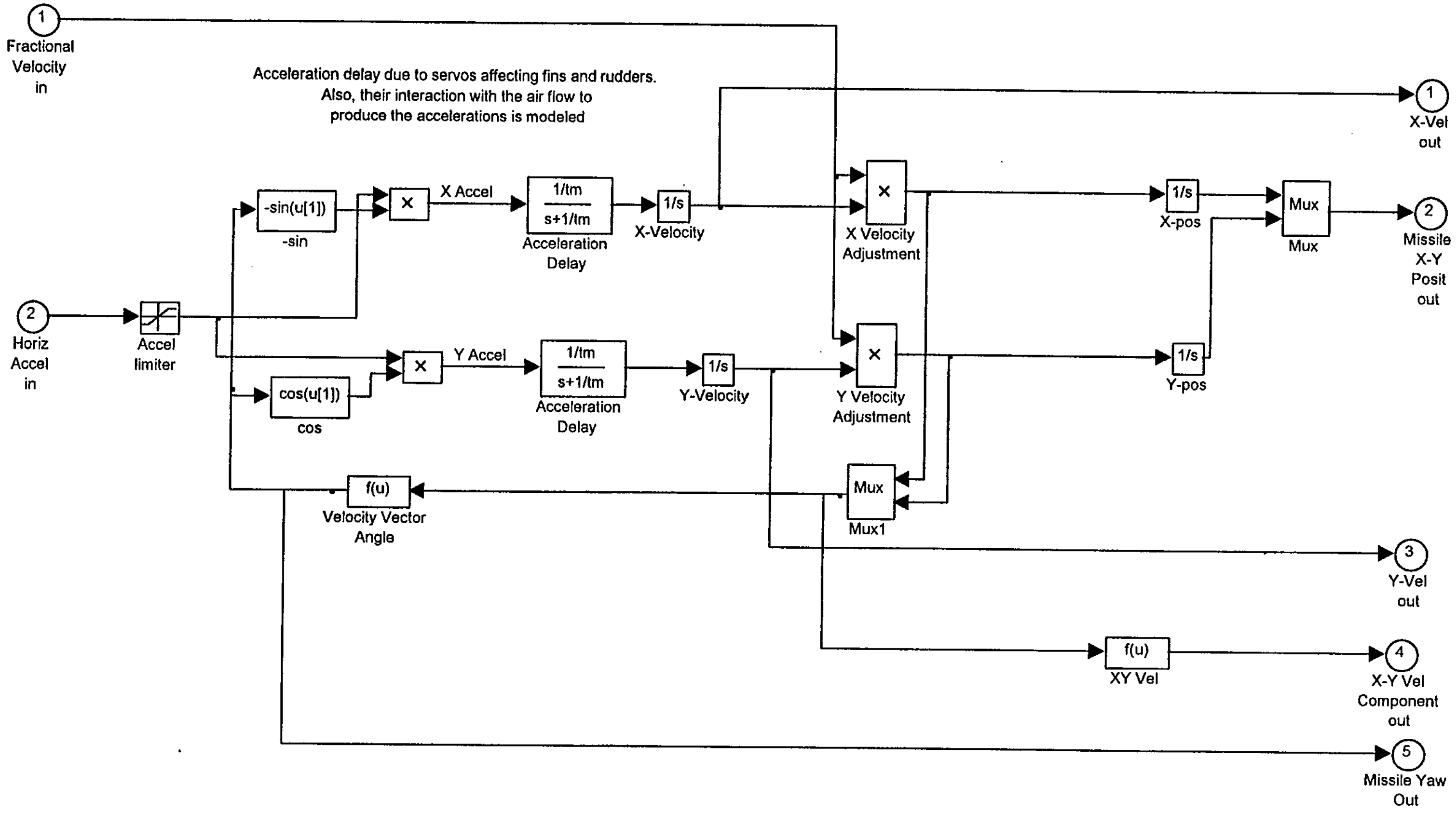
Missile Dynamics
Velocity Change



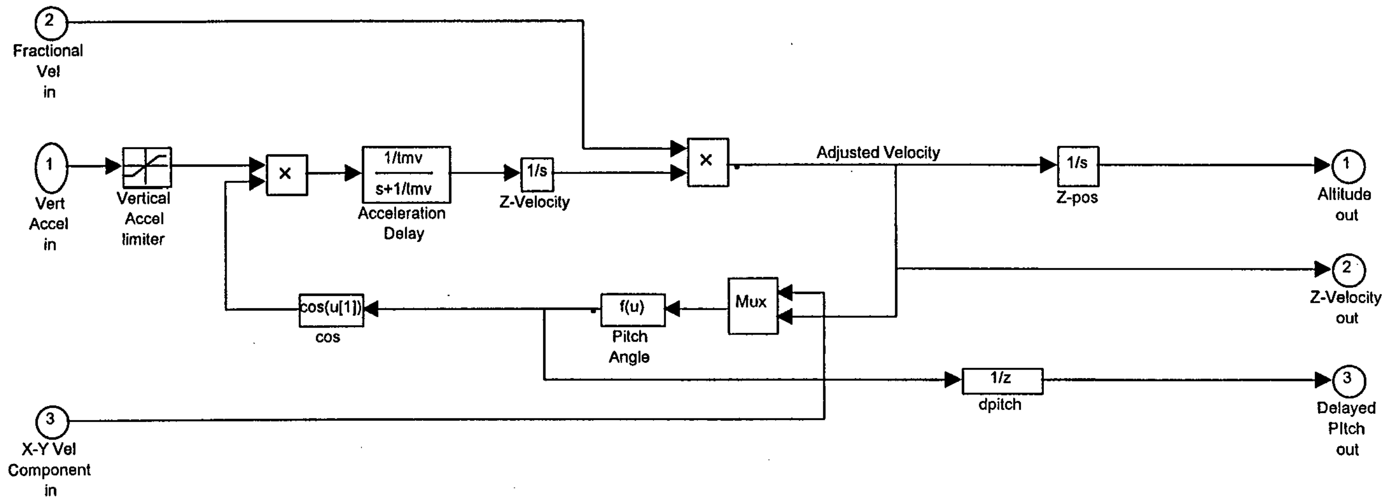
Velocity Change Delay



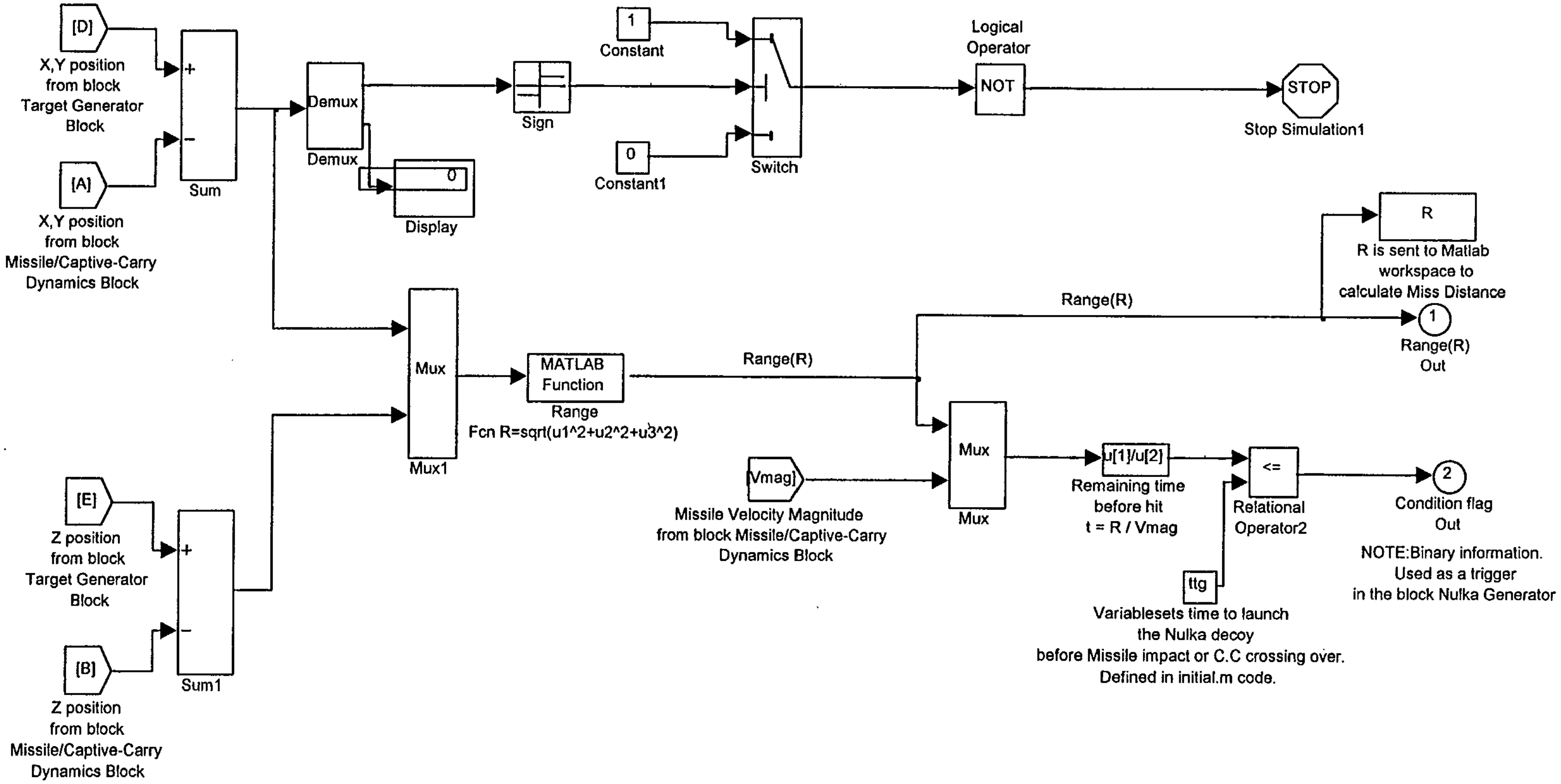
Missile Dynamics
X-Y Movement


Acceleration delay due to servos affecting fins and rudders. Also, their interaction with the air flow to produce the accelerations is modeled

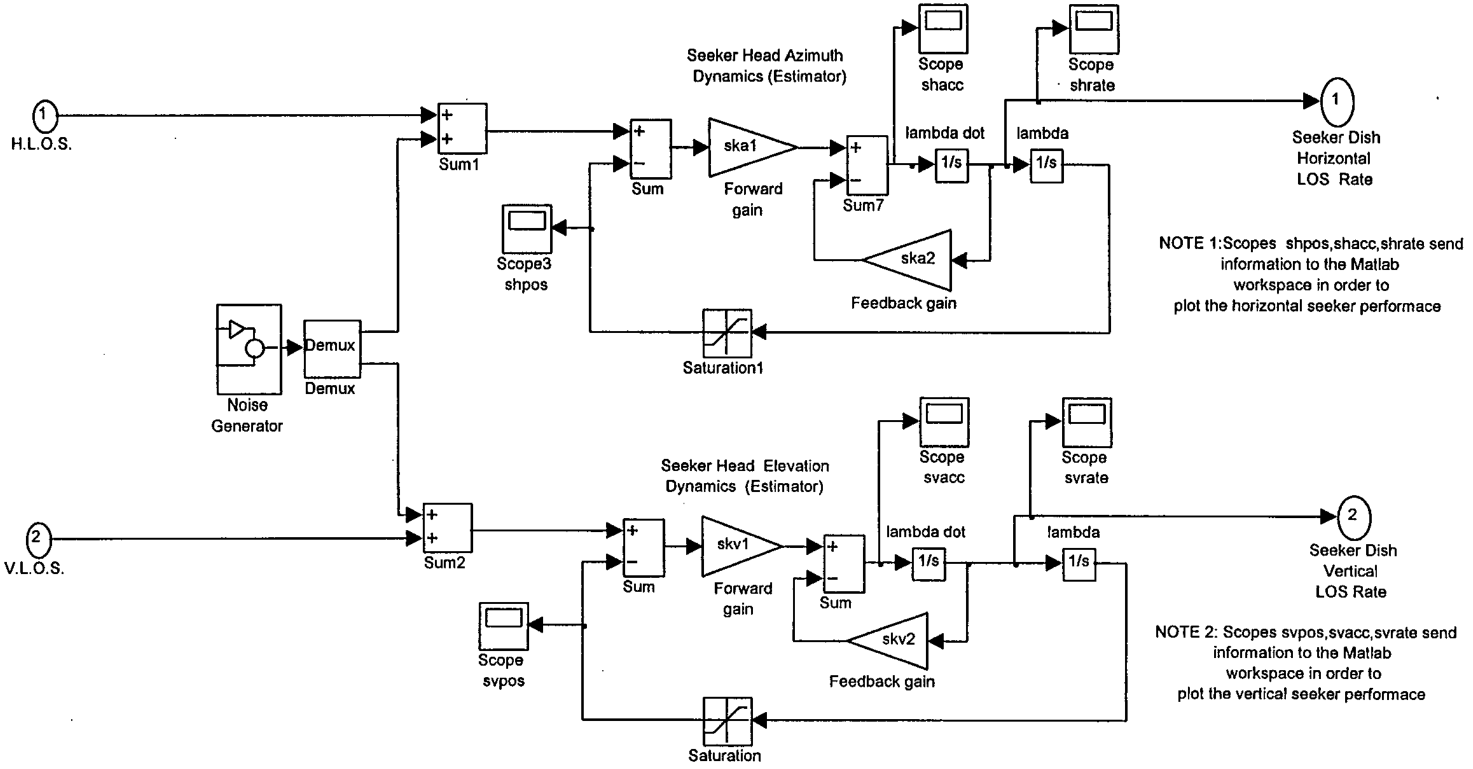
Altitude of Missile Flight Simulation



Time_to_Go and Miss_Distance



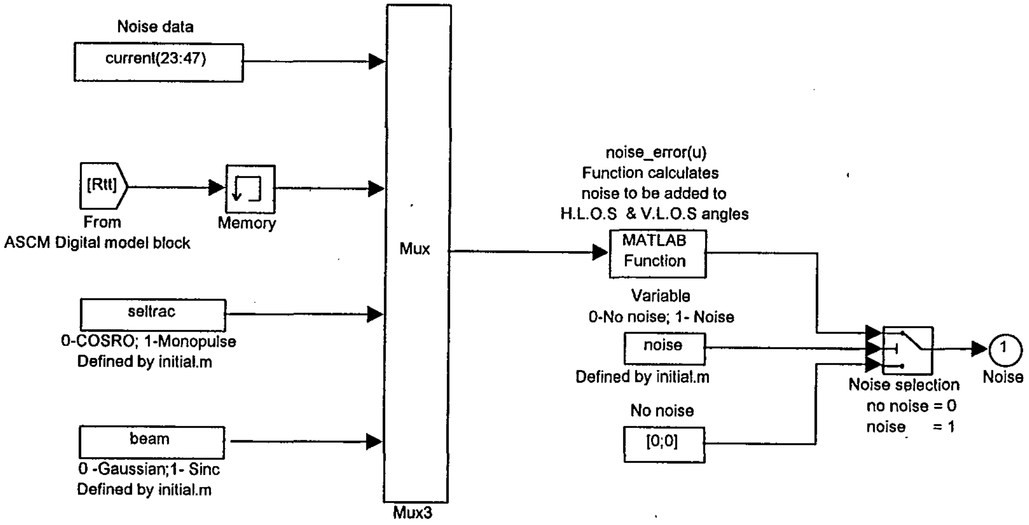
Seeker Dynamics
(Estimated LOS Rates)



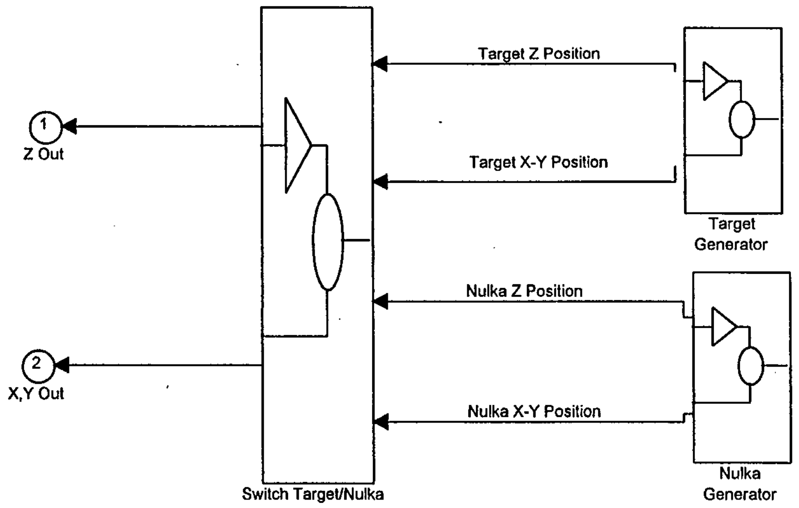
NOTE 1:Scopes shpos,shacc,shrate send information to the Matlab workspace in order to plot the horizontal seeker performace

NOTE 2: Scopes svpos,svacc,svrate send information to the Matlab workspace in order to plot the vertical seeker performace

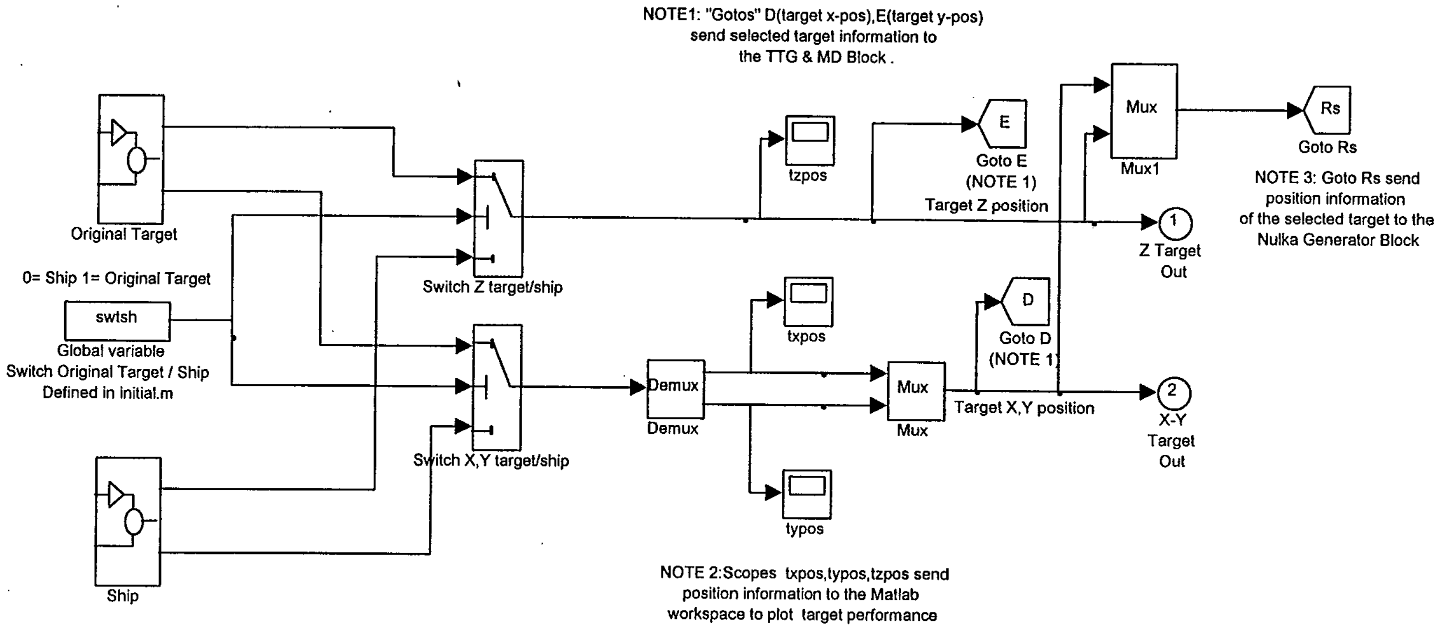
Noise Generator



General Target Model



Target Generator

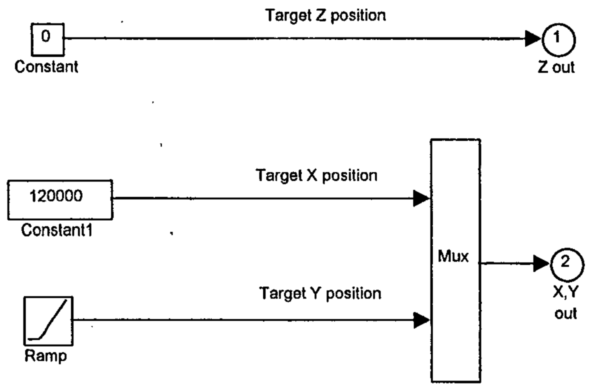


NOTE1: "Gotos" D(target x-pos),E(target y-pos) send selected target information to the TTG & MD Block .

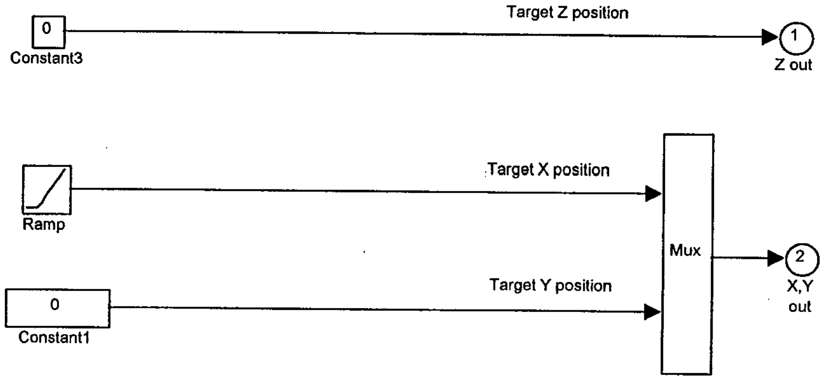
NOTE 2:Scopes txpos,typos,tzpos send position information to the Matlab workspace to plot target performance

NOTE 3: Goto Rs send position information of the selected target to the Nulka Generator Block

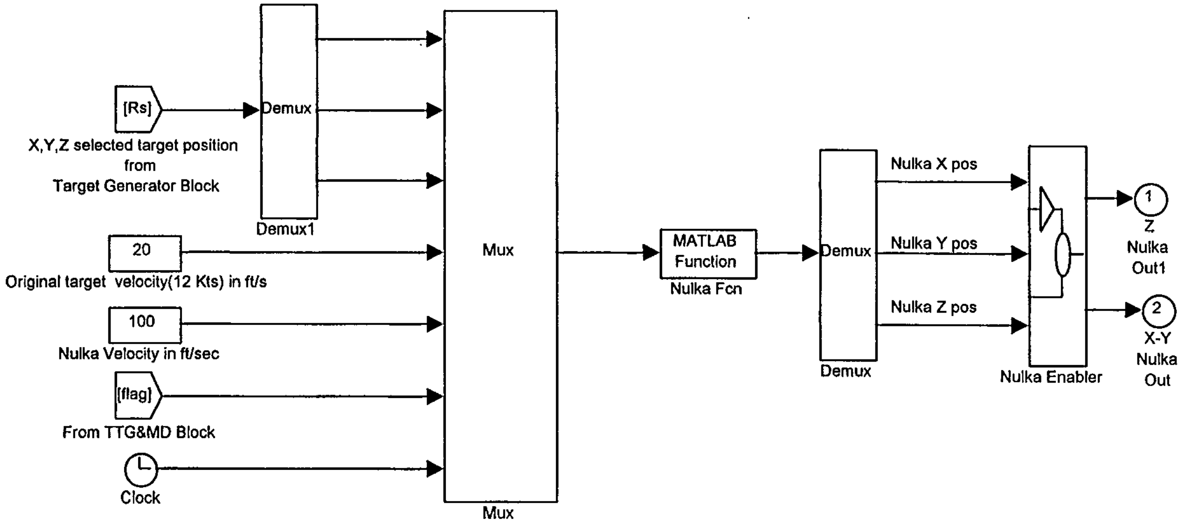
Original Target Generator



Ship Generator

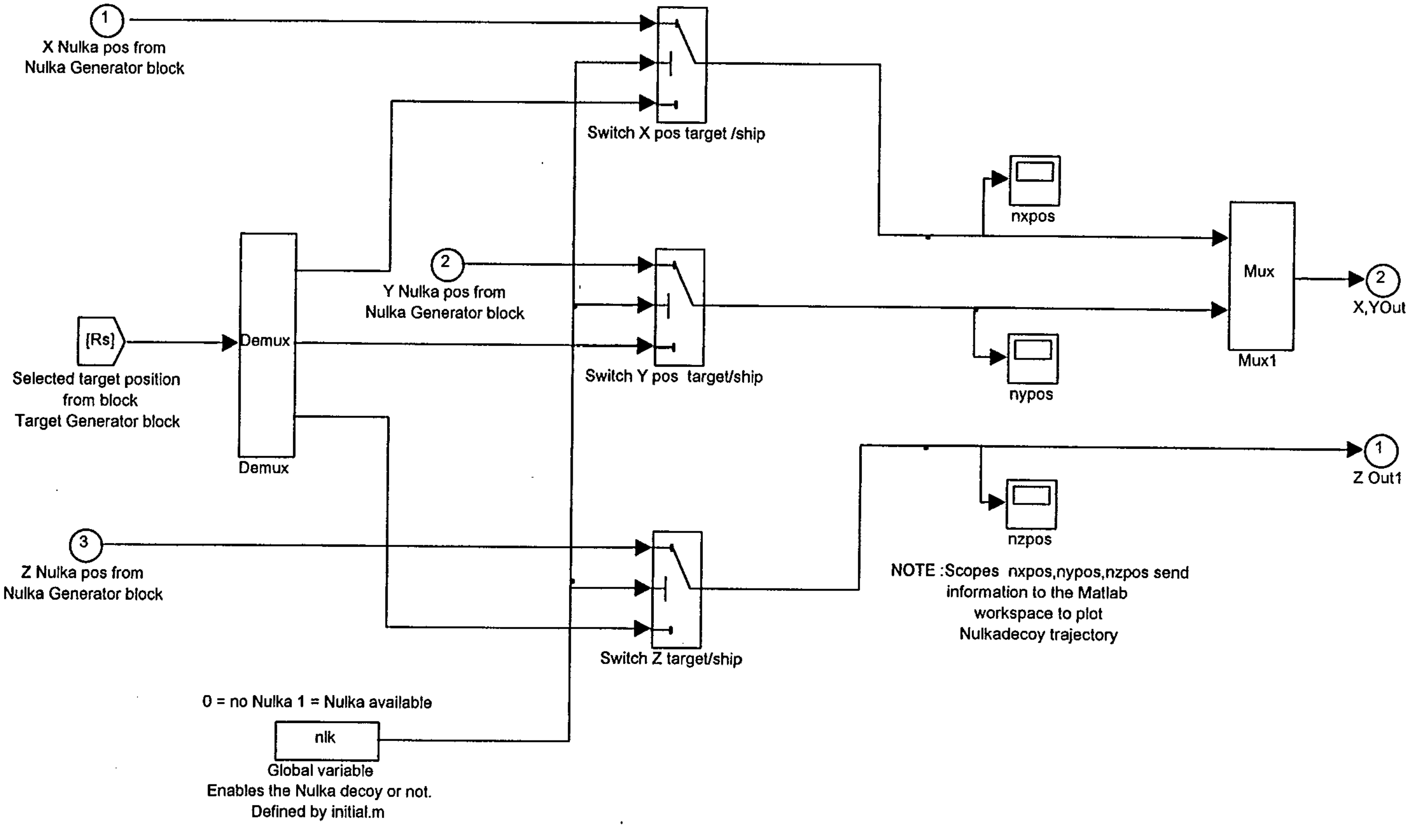


Nulka Generator



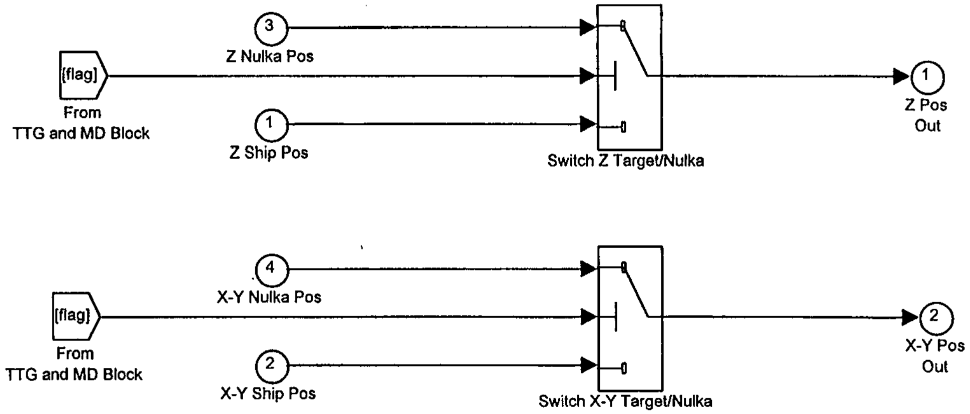
OBSERVATION:
If target Ship selected,
speed must be changed directly
here to 20 ft/sec .

Nulka Enabler



NOTE :Scopes nxpos,nypos,nzpos send information to the Matlab workspace to plot Nulkadecoy trajectory

Switch Target/Nulka



APPENDIX B. INITIALIZATION CODE initial.m

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%
%% Project: ASCM - Missile/Captive-Carry Simulation
%%
%% Name: initial.m
%%
%% Type:SCRIPT
%%
%% Purpose: This m-file stores several values of the
%%          parameters used for
%%          initialization of the ASCM Digital Model as well
%%          as the values of the seeker
%%          parameters used for noise calculation by the
%%          function noise.m.
%%
%% Date Last Modified: 07/31/98
%%
%% By: LT Wagner A. de Lima Goncalves
%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%
clear all
% Clear workspace to run initial.m code

global  po I             % po and I are global variables
                         % po is a matrix used for
                         % controlling the Nulka Rocket
                         % launching
                         % I is a structure that stores the
                         % initialization
                         % parameters used by ASCM Digital
                         % Model and noise calculation

%===========================================================

% Define initialization structure I
%
%                      General Switches

% num=simulation number (referred to the missile simulation)
% swtsh=switch_to_ship
% carry=threat_selection
% nlk=Nulka enabler
% chaff= chaff enabler
% noise= noise enabler
% seltrac = Select type of tracking ( 0 = COSRO ,
                                     %  1 =MONOPULSE )

%                    ASCM Digital Model

% ska1=seeker foward gain(azimuth)
% ska2=seeker feedback gain(azimuth)
% skv1=seeker foward gain(vertical)
% skv2=seeker feedback gain(vertical)
% enra=effective navigational ratio (foward gain-azimuth)
% enrb=effective navigational ratio (foward gain-vertical)
% ta1=autopilot foward gain(azimuth)
% ta2=autopilot feedback gain(azimuth)
% tb1=autopilot foward gain(vertical)
% tb2=autopilot feedback gain(vertical)
% tm=acceleration delay(X-Y movement)
% tmv=acceleration delay(Z movement)
% tv=velocity change delay
% ttg=time_to_go
% sekhlim=seeker horizontal limit(15 degees)
% sekvlim=seeker vertical limit(15 degees)

%                       COSRO SEEKER

% ppc= Peak Power (kW)
% freqc= Frequency (GHz)
% antgainc= Antenna Gain (dB)
% HPc = Half Power Beam Width-3 dB (degrees)
% noibwc = Noise Bandwidth(MHz)
% noifigc = Noise Figure (dB)
% rrc = Range Resolution (m)
% numpulc = Number of pulses integrated
% nosangc = Normalized offset angle
% envc = Envelope Correlation Time (s)
% nutfreqc = Nutation Frequency (Hz)
% serbwc = Servo Bandwidth (Hz)
% crossc = Target Radar Cross Section (m^2)
% alphac = One Way Atmospheric Attenuation(dB/Km)
% beam = Beam Shape ( 0 = gaussian , 1 = sinc )

%                     MONOPULSE SEEKER

% ppm= Peak Power (kW)
% freqm= Frequency (GHz)
% antgainm= Antenna Gain (dB)
% HPm = Half Power Beam Width-3 dB (degrees)
% noibwm = Noise Bandwidth(MHz)
% noifigm = Noise Figure (dB)
% rrm = Range Resolution (m)
% numpulm = Number of pulses integrated
% fslrm = First Side Lobe Ratio (dB)
% crossm = Target Radar Cross Section (m^2)
% alphac = One Way Atmospheric Attenuation ( dB/Km)

%============================================================

% Create cells that will be used to store the initialization
% parameters.The cells are
% required for dealing with the Matlab structure.

A=cell(1,1);
B=cell(1,1);
C=cell(1,1);
D=cell(1,1);
E=cell(1,1);
F=cell(1,1);
G=cell(1,1);
H=cell(1,1);
J=cell(1,1);
K=cell(1,1);
L=cell(1,1);
M=cell(1,1);
N=cell(1,1);
O=cell(1,1);
P=cell(1,1);
Q=cell(1,1);
R=cell(1,1);
S=cell(1,1);
T=cell(1,1);
U=cell(1,1);
V=cell(1,1);
W=cell(1,1);
X=cell(1,1);
Y=cell(1,1);
Z=cell(1,1);
a=cell(1,1);
b=cell(1,1);
c=cell(1,1);
d=cell(1,1);
e=cell(1,1);
f=cell(1,1);
g=cell(1,1);
h=cell(1,1);
k=cell(1,1);
l=cell(1,1);
```

```
m=cell(1,1);
n=cell(1,1);
o=cell(1,1);
p=cell(1,1);
q=cell(1,1);
r=cell(1,1);
s=cell(1,1);
t=cell(1,1);
u=cell(1,1);
v=cell(1,1);
w=cell(1,1);
x=cell(1,1);
y=cell(1,1);
z=cell(1,1);

%===========================================================
%
% Create values that will be assigned to cells created
% previously.
% These values are easier to read in the Appendix L in an
% Excel database format
%
aux1=[zeros(1,10) ,ones(1,10),ones(1,10),ones(1,10)];
aux2=[aux1(ones(1,60),:)]';
aux3=[zeros(1,30),ones(1,10)];
aux4=[aux3(ones(1,60),:)]';
aux5=[zeros(1,20),ones(1,10),zeros(1,10)];
aux6=[aux5(ones(1,60),:)]';
aux7=[2 4 6 8 10 12 14 16 18 20];
aux8=[aux7(ones(1,240),:)]';

b1=0.25;b2=0.1;b3=1;b4=4;

aux9=[[b1(ones(1,40),:)] [b2(ones(1,40),:)]
[b3(ones(1,40),:)] [b4(ones(1,40),:)]];
aux10=[[b1(ones(1,40),:)][b1(ones(1,40),:)][b1(ones(1,40),:)
][b1(ones(1,40),:)] ...
      [b1(ones(1,40),:)] [b2(ones(1,40),:)]
[b3(ones(1,40),:)] [b4(ones(1,40),:)]];
aux11=[[b1(ones(1,40),:)][b1(ones(1,40),:)][b1(ones(1,40),:)
][b1(ones(1,40),:)]...

[b1(ones(1,40),:)][b1(ones(1,40),:)][b1(ones(1,40),:)][b1(on
es(1,40),:)]...
      [b1(ones(1,40),:)] [b2(ones(1,40),:)]
[b3(ones(1,40),:)] [b4(ones(1,40),:)]];
aux12=[[b1(ones(1,40),:)][b1(ones(1,40),:)][b1(ones(1,40),:)
][b1(ones(1,40),:)]...
```

```
[b1(ones(1,40),:)][b1(ones(1,40),:)][b1(ones(1,40),:)][b1(on
es(1,40),:)]...

[b1(ones(1,40),:)][b1(ones(1,40),:)][b1(ones(1,40),:)][b1(on
es(1,40),:)]...
      [b1(ones(1,40),:)] [b2(ones(1,40),:)]
[b3(ones(1,40),:)] [b4(ones(1,40),:)]];

b5=1;b6=2;b7=4;b8=8;

aux13=[[b7(ones(1,40),:)][b7(ones(1,40),:)][b7(ones(1,40),:)
][b7(ones(1,40),:)]...

[b7(ones(1,40),:)][b7(ones(1,40),:)][b7(ones(1,40),:)][b7(on
es(1,40),:)]...

[b7(ones(1,40),:)][b7(ones(1,40),:)][b7(ones(1,40),:)][b7(on
es(1,40),:)]...

[b7(ones(1,40),:)][b7(ones(1,40),:)][b7(ones(1,40),:)][b7(on
es(1,40),:)]...
      [b5(ones(1,40),:)] [b6(ones(1,40),:)]
[b7(ones(1,40),:)] [b8(ones(1,40),:)]];
aux14=[[b7(ones(1,40),:)][b7(ones(1,40),:)][b7(ones(1,40),:)
][b7(ones(1,40),:)]...

[b7(ones(1,40),:)][b7(ones(1,40),:)][b7(ones(1,40),:)][b7(on
es(1,40),:)]...

[b7(ones(1,40),:)][b7(ones(1,40),:)][b7(ones(1,40),:)][b7(on
es(1,40),:)]...

[b7(ones(1,40),:)][b7(ones(1,40),:)][b7(ones(1,40),:)][b7(on
es(1,40),:)]...

[b7(ones(1,40),:)][b7(ones(1,40),:)][b7(ones(1,40),:)][b7(on
es(1,40),:)]...
      [b5(ones(1,40),:)] [b6(ones(1,40),:)]
[b7(ones(1,40),:)] [b8(ones(1,40),:)]];

b9=0.25;b10=0.5;b11=1;b12=4;

aux15=[[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40)
,:)][b10(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...
```

```
[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)] ...
     [b9(ones(1,40),:)] [b10(ones(1,40),:)]
[b11(ones(1,40),:)] [b12(ones(1,40),:)]];
aux16=[[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40)
,:)][b10(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...
     [b9(ones(1,40),:)] [b10(ones(1,40),:)]
[b11(ones(1,40),:)] [b12(ones(1,40),:)]];
aux17=[[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40)
,:)][b10(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...
```

```
[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...
       [b9(ones(1,40),:)] [b10(ones(1,40),:)]
[b11(ones(1,40),:)] [b12(ones(1,40),:)]];
aux18=[[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40)
,:)][b10(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...
       [b9(ones(1,40),:)] [b10(ones(1,40),:)]
[b11(ones(1,40),:)] [b12(ones(1,40),:)]];

b13=0.5;b14=1;b15=2;b16=4;

aux19=[[b15(ones(1,40),:)][b15(ones(1,40),:)][b15(ones(1,40)
,:)][b15(ones(1,40),:)]...
```

```
[b15(ones(1,40),:)][b15(ones(1,40),:)][b15(ones(1,40),:)][b1
5(ones(1,40),:)]...

[b15(ones(1,40),:)][b15(ones(1,40),:)][b15(ones(1,40),:)][b1
5(ones(1,40),:)]...

[b15(ones(1,40),:)][b15(ones(1,40),:)][b15(ones(1,40),:)][b1
5(ones(1,40),:)]...

[b15(ones(1,40),:)][b15(ones(1,40),:)][b15(ones(1,40),:)][b1
5(ones(1,40),:)]...

[b15(ones(1,40),:)][b15(ones(1,40),:)][b15(ones(1,40),:)][b1
5(ones(1,40),:)]...

[b15(ones(1,40),:)][b15(ones(1,40),:)][b15(ones(1,40),:)][b1
5(ones(1,40),:)]...

[b15(ones(1,40),:)][b15(ones(1,40),:)][b15(ones(1,40),:)][b1
5(ones(1,40),:)]...

[b15(ones(1,40),:)][b15(ones(1,40),:)][b15(ones(1,40),:)][b1
5(ones(1,40),:)]...

[b15(ones(1,40),:)][b15(ones(1,40),:)][b15(ones(1,40),:)][b1
5(ones(1,40),:)]...
        [b13(ones(1,40),:)] [b14(ones(1,40),:)]
[b15(ones(1,40),:)] [b16(ones(1,40),:)]];
aux20=[[b15(ones(1,40),:)][b15(ones(1,40),:)][b15(ones(1,40)
,:)][b15(ones(1,40),:)]...

[b15(ones(1,40),:)][b15(ones(1,40),:)][b15(ones(1,40),:)][b1
5(ones(1,40),:)]...

[b15(ones(1,40),:)][b15(ones(1,40),:)][b15(ones(1,40),:)][b1
5(ones(1,40),:)]...

[b15(ones(1,40),:)][b15(ones(1,40),:)][b15(ones(1,40),:)][b1
5(ones(1,40),:)]...

[b15(ones(1,40),:)][b15(ones(1,40),:)][b15(ones(1,40),:)][b1
5(ones(1,40),:)]...

[b15(ones(1,40),:)][b15(ones(1,40),:)][b15(ones(1,40),:)][b1
5(ones(1,40),:)]...

[b15(ones(1,40),:)][b15(ones(1,40),:)][b15(ones(1,40),:)][b1
5(ones(1,40),:)]...
```

```
[b15(ones(1,40),:)][b15(ones(1,40),:)][b15(ones(1,40),:)][b1
5(ones(1,40),:)]...

[b15(ones(1,40),:)][b15(ones(1,40),:)][b15(ones(1,40),:)][b1
5(ones(1,40),:)]...

[b15(ones(1,40),:)][b15(ones(1,40),:)][b15(ones(1,40),:)][b1
5(ones(1,40),:)]...

[b15(ones(1,40),:)][b15(ones(1,40),:)][b15(ones(1,40),:)][b1
5(ones(1,40),:)] ...
      [b13(ones(1,40),:)] [b14(ones(1,40),:)]
[b15(ones(1,40),:)] [b16(ones(1,40),:)]];
aux21=[[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40)
,:)][b10(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...

[b10(ones(1,40),:)][b10(ones(1,40),:)][b10(ones(1,40),:)][b1
0(ones(1,40),:)]...
```

```
       [b9(ones(1,40),:)] [b10(ones(1,40),:)]
 [b11(ones(1,40),:)] [b12(ones(1,40),:)]];

b17=0.1309;b18=0.2618;b19=0.3491;b20=0.5236;

aux22=[[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40)
,:)][b18(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...
       [b17(ones(1,40),:)] [b18(ones(1,40),:)]
[b19(ones(1,40),:)] [b20(ones(1,40),:)]];
aux23=[[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40)
,:)][b18(ones(1,40),:)]...
```

```
[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...

[b18(ones(1,40),:)][b18(ones(1,40),:)][b18(ones(1,40),:)][b1
8(ones(1,40),:)]...
      [b17(ones(1,40),:)] [b18(ones(1,40),:)]
[b19(ones(1,40),:)] [b20(ones(1,40),:)]];

a4=[0.5];
a6=[2];
a8=[8];
a12=[250];
a14=[9];
a16=[33];
a18=[4.5];
```

```
a20=[10];
a22=[11];
a24=[100];
a26=[0.06];
a28=[60];
a30=[3000];
a32=[0.055];
a34=[24];
a40=[30];
%
%============================================================
%
% Assign the values of the initialization parameters to the
% cells.
%
A={[(1:1:2400)']};
B={[ones(1,2400)']};
C={[ones(1,2400)']};
D={[ones(1,2400)']};
E={[zeros(1,2400)']};
F={aux2(:)};
G={aux4(:)};
H={[aux9(:); b1(ones(2240,1),:)]};
J={[aux10(:); b1(ones(2080,1),:)]};
K={[aux11(:); b1(ones(1920,1),:)]};
L={[aux12(:); b1(ones(1760,1),:)]};
M={[aux13(:); b7(ones(1600,1),:)]};
N={[aux14(:); b7(ones(1440,1),:)]};
O={[aux15(:); b10(ones(1280,1),:)]};
P={[aux16(:); b10(ones(1120,1),:)]};
Q={[aux17(:); b10(ones(960,1),:)]};
R={[aux18(:); b10(ones(800,1),:)]};
S={[aux19(:); b15(ones(640,1),:)]};
T={[aux20(:); b15(ones(480,1),:)]};
U={[aux21(:); b10(ones(320,1),:)]};
V={aux8(:)};
W={[aux22(:); b18(ones(160,1),:)]};
X={[aux23(:)]};
Y={[a12([ones(1,2400)],:)]};
Z={[a14([ones(1,2400)],:)]};
a={[a16([ones(1,2400)],:)]};
b={[a18([ones(1,2400)],:)]};
c={[a20([ones(1,2400)],:)]};
d={[a22([ones(1,2400)],:)]};
e={[a24([ones(1,2400)],:)]};
f={[a24([ones(1,2400)],:)]};
g={[a4([ones(1,2400)],:)]};
h={[a26([ones(1,2400)],:)]};
k={[a28([ones(1,2400)],:)]};
```

```
l={[a6([ones(1,2400)],:)]};
m={[a30([ones(1,2400)],:)]};
n={[a32([ones(1,2400)],:)]};
o={aux6(:)};
p={[a40([ones(1,2400)],:)]};
q={[a14([ones(1,2400)],:)]};
r={[a16([ones(1,2400)],:)]};
s={[a18([ones(1,2400)],:)]};
t={[a20([ones(1,2400)],:)]};
u={[a22([ones(1,2400)],:)]};
v={[a24([ones(1,2400)],:)]};
w={[a24([ones(1,2400)],:)]};
x={[a34([ones(1,2400)],:)]};
y={[a30([ones(1,2400)],:)]};
z={[a32([ones(1,2400)],:)]};

%===========================================================
% In this step, the cells with values from the several
% simulations are assigned to structure I.
%
%
I=struct('num',A,'swtsh',B,'carry',C,'nlk',D,'chaff',E,'nois
e',F,'seltrac',G,'ska1',H,...

'ska2',J,'skv1',K,'skv2',L,'enra',M,'enrb',N,'ta1',O,'ta2',P
,'tb1',Q,'tb2',R,...

'tm',S,'tmv',T,'tv',U,'ttg',V,'sekhlim',W,'sekvlim',X,'ppc',
Y,'freqc',Z,...

'antgainc',a,'HPc',b,'noibwc',c,'noifigc',d,'rrc',e,'numpulc
',f,...

'nosangc',g,'envc',h,'nutfreqc',k,'serbwc',l,'crossc',m,'alp
hac',n,...

'beam',o,'ppm',p,'freqm',q,'antgainm',r,'HPm',s,'noibwm',t,.
..

'noifigm',u,'rrm',v,'numpulm',w,'fslrm',x,'crossm',y,'alpham
',z);

%===========================================================

% This section shows the user a GUI (Graphical User
% Interface)
% "Menu" to select a pre-programmed simulation from the
% initialization structure I.
% Appendix    has the simulations numbers associated with
% all model parameters.
% In this GUI ,missile and captive-carry simulations are
% runned, stored and ,if desired,
% graphed for a comparitive analysis.

menu


%==============================================================

%Define po global variable. This variable plays an important
% role to set the exact
% moment of nulka rocket launching. Its parameters are :
% po= [ 'trigger time'(internal flag-allows change po value
% only once),
%     initial Nulka x-position,initial Nulka y-
%     position,initial Nulka z-position,
%     launching time].
% Intially all values are equal to zero.

po=[ 0 0 0 0 0];

%==============================================================
%
%   This section initializes the model parameters (Default)
%
%
%    *** SEEKER
% azimuth
  ska1=I.ska1(1,1);
  ska2=I.ska2(1,1);
% elevation
  skv1=I.skv1(1,1);
   skv2=I.skv2(1,1);

%    *** PROPORTIONAL NAVIGATION
%    *** EFFECTIVE NAVIGATION RATIO
% azimuth
  enra=I.enra(1,1);
% elevation
  enrb=I.enrb(1,1);

%    *** AUTOPILOT
% azimuth
  ta1=I.ta1(1,1);
  ta2=I.ta2(1,1);
% elevation
  tb1=I.tb1(1,1);
  tb2=I.tb2(1,1);
```

```
%    *** MISSILE DYNAMICS
% XY movement acceleration delay
%
tm=I.tm(1,1);

% Z movement acceleration delay
%
tmv=I.tmv(1,1);

% Velocity Change Delay
  tv=I.tv(1,1);

%  *** Time-to-Go
  ttg=I.ttg(1,1);


% *** Seeker FOV(15 degrees for each side of LOS
%                in azimuth & elevation)
%
%
% *** Values in radians
  sekhlim=I.sekhlim(1,1);
  sekvlim=I.sekvlim(1,1);

%Default parameters for running simulation

swtsh= I.swtsh(1,1);          %Simulation has a stopped target
                              %as default
carry=I.carry(1,1);           %Simulation has a missile as a
                              %threat as default
nlk=I.nlk(1,1);               %Simulation has no Nulka
                              %activated as default
chaff= I.chaff(1,1);          %Simulation has no chaff
                              %activated as default
noise= I.noise(1,1);          %Simulation has no noise in the
                              %seeker as default
num=I.num(1,1);               %Simulation number is set to 1 as
                              %default

%============================================================

  seltrac=I.seltrac(1,1);     %Simulation has a COSRO seeker as
                              %default
  beam =I.beam(1,1);          %Simulation has a Gaussian beam
                              %shape as default

%============================================================
%  ***COSRO seeker initial parameters

   ppc=I.ppc(1,1);
   freqc=I.freqc(1,1);
   antgainc=I.antgainc(1,1);
   HPc=I.HPc(1,1);
   noibwc=I.noibwc(1,1);
   noifigc=I.noifigc(1,1);
   rrc=I.rrc(1,1);
   numpulc=I.numpulc(1,1);
   nosangc=I.nosangc(1,1);
   envc=I.envc(1,1);
   nutfreqc=I.nutfreqc(1,1);
   serbwc=I.serbwc(1,1);
   crossc=I.crossc(1,1);
   alphac=I.alphac(1,1);

 % ***MONOPULSE seeker initial parameters

   ppm=I.ppm(1,1);
   freqm=I.freqm(1,1);
   antgainm=I.antgainm(1,1);
   HPm=I.HPm(1,1);
   noibwm=I.noibwm(1,1);
   noifigm=I.noifigm(1,1);
   rrm=I.rrm(1,1);
   numpulm=I.numpulm(1,1);
   fslrm=I.fslrm(1,1);
   crossm=I.crossc(1,1);
   alpham=I.alphac(1,1);

%==============================================================
%
% Define the seekers values/parameters of the vector
"current" that will be used
% for the noise generation in the  Noise Generator Block.
%

 db=[0];          %dB is just an auxiliary variable to set
                  %zeros in the "current" vector

 current=[ [db([ones(1,22)])] I.ppc(1,1) I.freqc(1,1)
I.antgainc(1,1) I.HPc(1,1) ...
          I.noibwc(1,1) I.noifigc(1,1) I.rrc(1,1)
I.numpulc(1,1) I.nosangc(1,1)...
          I.envc(1,1) I.nutfreqc(1,1) I.serbwc(1,1)
I.crossc(1,1) I.alphac(1,1) ...
          I.ppm(1,1) I.freqm(1,1) I.antgainm(1,1)
I.HPm(1,1) I.noibwm(1,1) ...
```

```
            I.noifigm(1,1) I.rrc(1,1) I.numpulm(1,1)
I.fslrm(1,1) ...
            I.crossm(1,1) I.alpham(1,1)]';
```

APPENDIX C. FUNCTION CODE noise_error.m

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%
%% Project: ASCM - Missile/Captive-Carry Simulation
%%
%% Name: noise_error.m
%%
%% Type:FUNCTION
%%
%% Purpose: This m-file calculates the noise that will be
%% added to the H.L.O.S(Horizontal Line of Sight)
%% and V.L.O.S (Vertical Line of Sight) in the Seeker
%% Dynamics Block. The theory behind this calculation is
%% explained on body of the thesis(Chap.II)
%%
%% Date Last Modified: 07/31/98
%%
%% By: LT Wagner A. de Lima Goncalves
%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%
function y = noise_error(u)
%Create function noise_error
%
%===========================================================
%
%                         Definitions

R  = sqrt(u(26)^2+u(27)^2+u(28)^2+1e-10)*.3048;
% Range in meters (Units convertion)
% in order to work in the MKS system


if (u(29)==0),         %If seeker is COSRO

  aux   = u(1:8);      % aux is an auxiliary variable
  tek3  = u(9);         % Normalized offset angle
  tc    = u(10);       % Envelope correlation time (s)
  fs    = u(11);       % Nutation frequency (Hz)
  beta  = u(12);       % Servo bandwidth (Hz)
  beam  = u(30);       % Beam shape(0/Gaussian,1/sinc)

else                   %If seeker is Monopulse
```

```
   aux  = [u(15:22)];  % aux is an auxiliary variable
   slr1 = u(23);       % First side lobe Ratio (dB)

end;

Pt   = aux(1)*1e3;     % Peak Power (W)
freq = aux(2)*1e9;     % Frequency (Hz)
G    = 10^(aux(3)/10); % Antenna gain
HP   = aux(4)*pi/180;  % Half Power Beam Width-3dB (rd)
B    = aux(5)*1e6;     % Noise Bandwidth (Hz)
F    = 10^(aux(6)/10); % Noise figure
dR   = aux(7);          % Range resolution (m)
n    = aux(8);          % Number of pulses integrated
RCS  = u(13);          % Target Radar Cross Section (m^2)
alfa = u(14);          % One way atmosferic attenuation
                        % coeff(dB)

c    = 3e8;             % Speed of light
kT   = 4.14e-21;       % Product k(Boltzman's constant).T
                        % (300K)
%
%===========================================================
%
%
%                   S/N Ratio for a single pulse
%
wl   = c/freq;                                 % Wavelength
N    = kT*B*F;                                 % Noise

aRdB = alfa*2*R/1000;
% Atmospheric Attenuation 2-W to R (dB)

aR   = 10^(aRdB/10);
% Atmospheric Attenuation. 2-W to R

L    = exp(-aR);
% Atmospheric loss 2-way

SNR  = (Pt*G^2*RCS*wl^2*L)/((4*pi)^3*R^4*N); % S/N Ratio

if (u(29)==0),                  % If is is a COSRO seeker

% Poly Fit - Curves: Normalized offset angle X

Ks1/sqrt(Lk1)(and Ks1)(From Fig.14 on Chapter 2)
x1=[0.01,0.2,0.4,0.5,0.7,0.9,1];

    % Cosro/Gaussian/Thermal
   y1=[0.01,0.5,0.95,1,0.95,0.8,0.75];
   p1=polyfit(x1,y1,5);

  if (beam==0),       % If is a Gaussian beam shape for the
                      % COSRO Seeker
    ptet = p1;
    psci = [2.77,0.0001];

   % Cosro/Gaussian/Scintillation

  else
   % If is a Sinc beam shape for the COSRO Seeker

     x2=[0.1,0.4,0.5,0.7,0.8,1];
     y2=[0.25,0.9,1,1.15,1.2,1.05];
     p2=polyfit(x2,y2,5);

      ptet =p2;

   %Cosro/Sinc/Thermal

      x3=[0.1,0.4,0.6,0.7,0.8];
      y3=[0.25,1.2,1.9,2.5,3.3];
      p3=polyfit(x3,y3,5);

      psci =p3;

   %Cosro/Sinc/Scintillation

  end;

  KsLk    = polyval(ptet,tek3);
  Ks    = polyval(psci,tek3);

%                                  Standard Deviations

  stet    = HP/(KsLk*sqrt(SNR*n));          % Teta
  sci   = 0.225*HP*sqrt(beta/tc)/(fs*Ks);  % Scintilation
  sd    = sqrt(stet^2+sci^2);               % General

else                                % Monopulse

% Poly Fit - Curve: First Sidelobe Ratio X Km  (Gaussian)

     x4=[15,20,24,30,40];
     y4=[1.71,1.85,1.9,2,2.15];
     p4=polyfit(x4,y4,5);

  pm    = p4;
```

```
   Km    = polyval(pm,slr1);

                                                  % Standard Deviation

   sd    = HP/(Km*sqrt(2*SNR*n));

end;
%
%============================================================
%
%
% Errors (azimuth => dfi, elevation => dteta)
%
%    Note: The errors have a Gaussian distribution. The mean
%          should be zero (<erro>=0), and the standard
%           deviation given by the expressions above,
%           ie error = Normal(0,sd). Therefore, we can
%           randomly generate an "error" from a
%           Normal distribution (0,sd) for each angle
%           measured. This "error", when summed to the
%           actual value (VLOS,HLOS)causes the seeker to
%           have a behavior statistically similar to the
%            real system.

ph = randn;
pv = randn;

y=zeros(2,1);

y(1,1)   = sd*ph;  % Horizontal Angular Error
y(2,1)   = sd*pv;   % Vertical Angular Error
```

APPENDIX D. FUNCTION CODE nulka.m

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%
%% Project: ASCM - Missile/Captive-Carry Simulation
%%
%% Name: nulka.m
%%
%% Type:FUNCTION
%%
%% Purpose: This m-file is used to calculate the Nulka
%%          rocket position in a simulation.
%%          The Nulka rocket launching time is a function
%%          of the time_to_go. The function is
%%          located in the Nulka Generator Block.
%%          The Nulka intial position is on board of the
%%          ship and its final position is 45 degrees above
%%          the sea level at a height of 400 ft.
%%
%% Date Last Modified: 07/31/98
%%
%% By: LT Wagner A. de Lima Goncalves
%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%
function p=nulka(u)
%Creates the nulka function

global po
% Created in the initialization code initial.m.
% The matrix po play a important role in the Nulka
% lauching.Its structure is:
%     po= ['trigger time',Nulka x-position,Nulka y-position,
%           Nulka z-position,launching time']
%
%===========================================================
%
%                  Nulka Position Calculation
%



%     Initially the Nulka position is the same of the ship
```

```
Xn=u(1);               %Nulka x-position = Ship x-position

Yn=u(2);               %Nulka y-position = Ship y-position

Zn=u(3);               %Nulka z-position = Ship z-position

Vs=u(4);
% Nulka Horizontal Velocity = Ship Velocity
% Assume values of 50/3 ft/sec (10 Knts) or
% 20ft/sec (12knts)

Vn=u(5);
%Nulka Ascension Magnitude Velocity (100 ft/sec)

flag=u(6);
% flag - allows the Nulka rocket be launched only once when
% time_to_go is reached.

t=u(7);
%Introduces the current simulation time

if flag==1             %Time_to_go reached ?

   if po(1)==0
%Yes,Time_to_go reached.'Trigger time' reached ?

      po(2:5)=[Xn,Yn,Zn,t];
% No,'Trigger time' not reached yet.Freeze the current
% ship position and simulation time.

      po(1)=1;
 %Set the 'Trigger time' to one.'Trigger time' reached.

end

dt=t-po(5);
% Yes,'Trigger time reached',calculate the time difference
% between the current simulation time and the instant that
% 'Trigger time' was reached.

%          Calculate the current Nulka position

Xn=po(2)+Vs*dt;
Yn=po(3)+Vn*cos(1.309)*dt;
Zn=po(4)+Vn*sin(1.309)*dt;

%                   Nulka altitude checking
```

```
ttop=400/(Vn*sin(1.309));
% Maximum time to reach the height of 400 ft with
% vertical component of the Nulka ascension magnitude
% velocity.


if dt>=ttop
% If the time difference is bigger than the maximum time
% to reach 400 ft height,keep the Nulka in a constant
% position in relation to the ship.


   Xn=po(2)+Vs*ttop;
   Yn=po(3)+Vn*cos(1.309)*ttop;
   Zn=po(4)+Vn*sin(1.309)*ttop;
end

end
% Send the Nulka position back to the Nulka Generator
p(1)=Xn;
p(2)=Yn;
p(3)=Zn;
```

APPENDIX E. FUNCTION CODE menu.m

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%
%% Project: ASCM - Missile/Captive-Carry Simulation
%%
%% Name: menu.m
%%
%% Type:FUNCTION
%%
%% Purpose: This m-file is a machine-generated
%% representation of a Handle Graphics object
%% and its children.
%% To reopen this object, just type the name of the M-file
%% at the MATLAB prompt.
%% The M-file and its associated MAT-file must be in your
%% path.
%%
%% Date Last Modified: 07/31/98
%%
%% By: LT Wagner A. de Lima Goncalves
%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

function fig = menu()

load menu

h0 = figure('Color',[1 1 1], ...
   'Colormap',mat0, ...
   'Name','Menu', ...
   'PaperPosition',[0.25 2.5 8 6.000000000000001], ...
   'PointerShapeCData',mat1, ...
   'Position',[1 34 1024 687], ...
   'Tag','Fig1');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'ListboxTop',0, ...
   'Position',mat2, ...
   'Style','frame', ...
   'Tag','Frame2');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[0 0.501960784313725 1], ...
   'ListboxTop',0, ...
   'Position',mat3, ...
   'String','Beam shape', ...
   'Style','frame', ...
   'Tag','Frame1');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[0 0.501960784313725 1], ...
   'ListboxTop',0, ...
   'Position',mat4, ...
   'Style','frame', ...
   'Tag','Frame1');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[0 0.501960784313725 1], ...
   'ListboxTop',0, ...
   'Position',[380.4827586206897 11.17241379310345
230.896551724138 195.5172413793104], ...
   'String',mat5, ...
   'Style','frame', ...
   'Tag','Frame1');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'ListboxTop',0, ...
   'Position',[438.2068965517242 142.1379310344828
142.1379310344828 21.10344827586208], ...
   'String','If noise =On and Tracker type=On', ...
   'Style','text', ...
   'Tag','StaticText5');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[0 0.501960784313725 1], ...
   'ListboxTop',0, ...
   'Position',mat6, ...
   'String',mat7, ...
   'Style','frame', ...
   'Tag','Frame1');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontSize',14, ...
   'ListboxTop',0, ...
   'Position',mat8, ...
   'String','ASCM Model Parameters', ...
   'Style','text', ...
   'Tag','StaticText6');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',mat9, ...
   'String','Parameters ', ...
   'Style','text', ...
   'Tag','StaticText9');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'Callback',mat10, ...
   'Position',mat11, ...
   'String',mat12, ...
   'Style','listbox', ...
   'Tag','mono', ...
   'Value',10);
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'Callback',mat13, ...
   'Position',mat14, ...
   'String',mat15, ...
   'Style','listbox', ...
   'Tag','ascm', ...
   'Value',1);
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[0 0.501960784313725 1], ...
   'ListboxTop',0, ...
   'Position',[25.44827586206897 11.17241379310345
135.9310344827587 304.1379310344829], ...
   'String','Beam shape', ...
   'Style','frame', ...
   'Tag','Frame1');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[0 0.501960784313725 1], ...
   'HandleVisibility','off', ...
   'ListboxTop',0, ...
   'Position',[26.06896551724138 318.4137931034484
235.8620689655173 91.24137931034483], ...
   'Style','frame', ...
   'Tag','Frame1');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[0 0.501960784313725 1], ...
   'ListboxTop',0, ...
   'Position',[390.4137931034484 319.0344827586208
111.1034482758621 90.00000000000001], ...
```

```
   'Style','frame', ...
   'Tag','Frame1');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[0 0.501960784313725 1], ...
   'ListboxTop',0, ...
   'Position',mat16, ...
   'Style','frame', ...
   'Tag','Frame1');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',[447.5172413793105 219.1034482758621
37.24137931034483 19.86206896551725], ...
   'String','Current Value', ...
   'Style','text', ...
   'Tag','StaticText11');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'Callback',mat17, ...
   'ListboxTop',0, ...
   'Position',mat18, ...
   'String','0.25', ...
   'Style','text', ...
   'Tag','value1');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',[462.4137931034484 26.68965517241379
37.24137931034483 21.10344827586208], ...
   'String','Current Value', ...
   'Style','text', ...
   'Tag','StaticText15');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'Callback',mat19, ...
   'ListboxTop',0, ...
   'Position',mat20, ...
   'String','3000', ...
   'Style','text', ...
   'Tag','value3');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'Callback','update', ...
   'ListboxTop',0, ...
   'Position',mat21, ...
   'String',mat22, ...
   'Style','popupmenu', ...
   'Tag','PopupMenu1', ...
   'Value',1);
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontSize',10, ...
   'ListboxTop',0, ...
   'Position',mat23, ...
   'String','Select Missile Simulation', ...
   'Style','text', ...
   'Tag','StaticText1');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'Callback','update1,ascm', ...
   'ListboxTop',0, ...
   'Position',mat24, ...
   'String','Run C.C Simulation', ...
   'Tag','Pushbutton3');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'Callback','store_simulation1', ...
   'ListboxTop',0, ...
   'Position',mat25, ...
   'String','Store data', ...
   'Tag','Pushbutton3');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'Callback','ascm', ...
   'ListboxTop',0, ...
   'Position',[297.9310344827587 374.2758620689656
58.34482758620691 15.51724137931035], ...
   'String','Run Simulation', ...
   'Tag','Pushbutton1');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'Callback','store_simulation', ...
   'ListboxTop',0, ...
   'Position',mat26, ...
   'String','Store data', ...
   'Tag','Pushbutton2');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'Callback','save gold,close', ...
   'ListboxTop',0, ...
   'Position',mat27, ...
   'String','Exit', ...
   'Tag','Pushbutton1');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'Callback','simulations_plot', ...
   'ListboxTop',0, ...
   'Position',[528.2068965517243 374.896551724138
55.24137931034484 14.27586206896552], ...
   'String','Plot ', ...
   'Tag','Pushbutton4');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',[471.1034482758622 173.7931034482759
90.00000000000001 18.62068965517242], ...
   'String','Monopulse Parameters', ...
   'Style','text', ...
   'Tag','StaticText7');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',[249.5172413793104 173.7931034482759
85.65517241379313 19.24137931034483], ...
   'String','COSRO Parameters', ...
   'Style','text', ...
   'Tag','StaticText4');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'ListboxTop',0, ...
   'Position',[223.448275862069 143.3793103448276
128.4827586206897 22.3448275862069], ...
   'String','If noise =On and Tracker type=Off', ...
   'Style','text', ...
   'Tag','StaticText5');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',mat28, ...
   'String','Beam shape', ...
   'Style','text', ...
   'Tag','StaticText10');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',mat29, ...
   'String','Gaussian', ...
   'Style','radiobutton', ...
   'Tag','gaussian button');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',mat30, ...
   'String','Sinc', ...
   'Style','radiobutton', ...
   'Tag','sinc button');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',[168.8275862068966 88.75862068965519
50.27586206896553 15.51724137931035], ...
   'String','Parameters ', ...
   'Style','text', ...
   'Tag','StaticText8');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'Callback',mat31, ...
   'Position',mat32, ...
   'String',mat33, ...
   'Style','listbox', ...
   'Tag','cosro', ...
   'Value',14);
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',[234.6206896551725 25.44827586206897
37.24137931034483 18.62068965517242], ...
   'String','Current Value', ...
   'Style','text', ...
   'Tag','StaticText13');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'Callback',mat34, ...
   'ListboxTop',0, ...
   'Position',mat35, ...
   'String','0.055', ...
   'Style','text', ...
   'Tag','value2');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',mat36, ...
   'String','Basic Settings', ...
   'Style','text', ...
   'Tag','StaticText2');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',mat37, ...
   'String','Noise', ...
   'Style','text', ...
   'Tag','StaticText3');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',mat38, ...
   'String','On', ...
   'Style','radiobutton', ...
   'Tag','noise button');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',mat39, ...
   'String','On', ...
   'Style','radiobutton', ...
   'Tag','swtsh button', ...
   'Value',1);
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',[29.79310344827587 253.8620689655173
44.6896551724138 15.51724137931035], ...
   'String','Target', ...
   'Style','text', ...
   'Tag','StaticText3');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',mat40, ...
   'String','On', ...
   'Style','radiobutton', ...
   'Tag','carry button');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',mat41, ...
   'String','Missile', ...
   'Style','text', ...
   'Tag','StaticText3');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',mat42, ...
   'String','On', ...
   'Style','radiobutton', ...
   'Tag','nlk button', ...
   'Value',1);
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',mat43, ...
   'String','Nulka', ...
   'Style','text', ...
   'Tag','StaticText3');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',mat44, ...
   'String','On', ...
   'Style','radiobutton', ...
   'Tag','chaff button');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',mat45, ...
   'String','Chaff', ...
   'Style','text', ...
   'Tag','StaticText3');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',[98.0689655172414 86.89655172413795
44.6896551724138 18.62068965517242], ...
   'String','On', ...
   'Style','radiobutton', ...
   'Tag','seltrac button');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',[31.0344827586207 86.89655172413795
44.6896551724138 19.24137931034483], ...
   'String','Tracker type', ...
   'Style','text', ...
   'Tag','StaticText3');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'ListboxTop',0, ...
   'Position',mat46, ...
   'String','Off=original target  On=ship', ...
   'Style','text', ...
   'Tag','StaticText17');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'ListboxTop',0, ...
   'Position',mat47, ...
   'String','Off=Captive Carry  On=missile', ...
   'Style','text', ...
   'Tag','StaticText18');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'ListboxTop',0, ...
   'Position',mat48, ...
   'String','Off=No nulka  On=nulka on', ...
   'Style','text', ...
   'Tag','StaticText19');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'ListboxTop',0, ...
   'Position',mat49, ...
   'String','Off=chaff off  On=chaff on', ...
   'Style','text', ...
   'Tag','StaticText20');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'ListboxTop',0, ...
   'Position',mat50, ...
   'String','Off=No seeker noise  On=seeker noise', ...
   'Style','text', ...
   'Tag','StaticText21');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'HorizontalAlignment','left', ...
   'ListboxTop',0, ...
   'Position',mat51, ...
   'String','Off=Cosro  On=Monopulse', ...
   'Style','text', ...
   'Tag','StaticText22');
if nargout > 0, fig = h0; end
```

APPENDIX F. FUNCTION CODE simulations_plot.m

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%
%% Project: ASCM - Missile/Captive-Carry Simulation
%%
%% Name: simulations_plot.m
%%
%% Type:FUNCTION
%%
%% Purpose: This m-file is a machine-generated
%% representation of a Handle Graphics object and its
%% children.
%% To reopen this object, just type the name of the M-file
%% at the MATLAB prompt.
%% The M-file and its associated MAT-file must be in your
%% path.
%%
%% Date Last Modified: 07/31/98
%%
%% By: LT Wagner A. de Lima Goncalves
%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%


function fig = simulations_plot()

load simulations_plot

h0 = figure('Color',[0 0.501960784313725 1], ...
   'Colormap',mat0, ...
   'PaperOrientation','landscape', ...
   'PaperPosition',[1.5 1.25 8 6.000000000000001], ...
   'PointerShapeCData',mat1, ...
   'Position',[1 34 1024 687], ...
   'Renderer','zbuffer', ...
   'RendererMode','manual', ...
   'Tag','Simulations Plot');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'ListboxTop',0, ...
   'Position',[361.8620689655173 243.9310344827587
216.6206896551725 128.4827586206897], ...
   'Style','frame', ...
   'Tag','Frame1');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'ListboxTop',0, ...
   'Position',[360.0000000000001 45.31034482758621
216.6206896551725 128.4827586206897], ...
   'Style','frame', ...
   'Tag','Frame1');
h1 = uicontrol('Parent',h0, ...
   'ListboxTop',0, ...
   'Style','text', ...
   'Tag','ZOOMFigureState', ...
   'UserData',mat2, ...
   'Visible','off');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'Callback','plot1', ...
   'Position',[386.6896551724139 265.6551724137931
179.3793103448276 76.34482758620692], ...
   'String',mat3, ...
   'Style','listbox', ...
   'Tag','Listbox1', ...
   'Value',1);
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 1], ...
   'Callback','plot2', ...
   'Position',[382.344827586207 68.27586206896554
183.7241379310345 75.72413793103451], ...
   'String',mat4, ...
   'Style','listbox', ...
   'Tag','Listbox2', ...
   'Value',1);
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 0.501960784313725], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',mat5, ...
   'String','Captive-Carry Simulation', ...
   'Style','text', ...
   'Tag','StaticText3');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 0.501960784313725], ...
   'FontWeight','bold', ...
   'ListboxTop',0, ...
   'Position',mat6, ...
   'String','Missile Simulation', ...
   'Style','text', ...
   'Tag','StaticText2');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[1 1 0.501960784313725], ...
   'FontSize',12, ...
   'ListboxTop',0, ...
   'Position',[411.5172413793104 388.5517241379311
121.0344827586207 18], ...
   'String','Simulation Graphs ', ...
   'Style','text', ...
   'Tag','StaticText1');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'BackgroundColor',[0 0.501960784313725 1], ...
   'ListboxTop',0, ...
   'Position',mat7, ...
   'Style','frame', ...
   'Tag','Frame3');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'Callback','grid', ...
   'ListboxTop',0, ...
   'Position',[426.4137931034484 211.6551724137931
37.24137931034483 12.41379310344828], ...
   'String','Grid', ...
   'Tag','Pushbutton1');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'Callback','close', ...
   'ListboxTop',0, ...
   'Position',[426.4137931034484 198 37.24137931034483
12.41379310344828], ...
   'String',mat8, ...
   'Tag','Pushbutton2');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'Callback','zoom on', ...
   'ListboxTop',0, ...
   'Position',[492.2068965517242 211.6551724137931
37.24137931034483 12.41379310344828], ...
   'String',mat9, ...
   'Tag','Pushbutton3');
h1 = uicontrol('Parent',h0, ...
   'Units','points', ...
   'Callback','print -dwinc', ...
   'ListboxTop',0, ...
   'Position',mat10, ...
   'String',mat11, ...
   'Tag','Pushbutton4');
h1 = axes('Parent',h0, ...
   'View',[40 40], ...
   'CameraUpVector',[0 0 1], ...
   'Color',[1 1 1], ...
   'ColorOrder',mat12, ...
   'Position',[0.13 0.5810982658959537 0.3270231213872832
0.3439017341040462], ...
   'XColor',[0 0 0], ...
   'XGrid','on', ...
   'YColor',[0 0 0], ...
   'YGrid','on', ...
   'ZColor',[0 0 0], ...
   'ZGrid','on');
h2 = line('Parent',h1, ...
   'Color',[1 0 0], ...
   'LineStyle','none', ...
   'Marker','.', ...
   'XData',mat13, ...
   'YData',mat14, ...
   'ZData',mat15);
h2 = line('Parent',h1, ...
   'Color',[1 0 1], ...
   'LineStyle','none', ...
   'Marker','+', ...
   'XData',mat16, ...
   'YData',mat17, ...
   'ZData',mat18);
h2 = line('Parent',h1, ...
   'Color',[0 1 0], ...
   'LineStyle','none', ...
   'Marker','*', ...
   'XData',mat19, ...
   'YData',mat20, ...
   'ZData',mat21);
h2 = text('Parent',h1, ...
   'Color',[0 0 0], ...
   'HandleVisibility','off', ...
   'HorizontalAlignment','right', ...
   'Position',[749441.8477667256 -7776.386765283653
1067.849833795002], ...
   'String','x-axis', ...
   'VerticalAlignment','top');
set(get(h2,'Parent'),'XLabel',h2);
h2 = text('Parent',h1, ...
   'Color',[0 0 0], ...
   'HandleVisibility','off', ...
   'Position',[811193.4335722937 -7159.744849112582
1079.837853354824], ...
   'String','y-axis', ...
   'VerticalAlignment','top');
set(get(h2,'Parent'),'YLabel',h2);
h2 = text('Parent',h1, ...
   'Color',[0 0 0], ...
   'HandleVisibility','off', ...
   'HorizontalAlignment','center', ...
   'Position',[615184.7636742736 -7765.888135126959
1206.256968712944], ...
   'Rotation',90, ...
   'String','z-axis', ...
   'VerticalAlignment','baseline');
set(get(h2,'Parent'),'ZLabel',h2);
h2 = text('Parent',h1, ...
   'Color',[0 0 0], ...
   'HandleVisibility','off', ...
   'HorizontalAlignment','center', ...
   'Position',[659080.864378504 -6215.741066851441
1350.113203430804], ...
   'String','Scenario 3-D OverView', ...
   'VerticalAlignment','bottom');
set(get(h2,'Parent'),'Title',h2);
h1 = axes('Parent',h0, ...
   'View',[40 40], ...
   'CameraUpVector',[0 0 1], ...
   'Color',[1 1 1], ...
   'ColorOrder',mat22, ...
   'Position',[0.13 0.11 0.3270231213872832
0.3439017341040462], ...
   'XColor',[0 0 0], ...
   'XGrid','on', ...
   'YColor',[0 0 0], ...
   'YGrid','on', ...
   'ZColor',[0 0 0], ...
   'ZGrid','on');
h2 = line('Parent',h1, ...
   'Color',[1 0 0], ...
   'LineStyle','none', ...
   'Marker','.', ...
   'XData',mat23, ...
   'YData',mat24, ...
   'ZData',mat25);
h2 = line('Parent',h1, ...
   'Color',[1 0 1], ...
   'LineStyle','none', ...
   'Marker','+', ...
   'XData',mat26, ...
   'YData',mat27, ...
   'ZData',mat28);
h2 = line('Parent',h1, ...
   'Color',[0 1 0], ...
   'LineStyle','none', ...
   'Marker','*', ...
   'XData',mat29, ...
   'YData',mat30, ...
   'ZData',mat31);
h2 = text('Parent',h1, ...
   'Color',[0 0 0], ...
   'HandleVisibility','off', ...
   'HorizontalAlignment','right', ...
   'Position',[749441.8477667255 -31105.54706113461
5339.249168975011], ...
   'String','x-axis', ...
   'VerticalAlignment','top');
set(get(h2,'Parent'),'XLabel',h2);
h2 = text('Parent',h1, ...
   'Color',[0 0 0], ...
   'HandleVisibility','off', ...
   'Position',[811193.4335722935 -28638.97939645033
5399.18926677412], ...
   'String','y-axis', ...
   'VerticalAlignment','top');
set(get(h2,'Parent'),'YLabel',h2);
h2 = text('Parent',h1, ...
   'Color',[0 0 0], ...
   'HandleVisibility','off', ...
   'HorizontalAlignment','center', ...
   'Position',[610809.5151661402 -31210.40331688718
6031.284843564718], ...
   'Rotation',90, ...
   'String','z-axis', ...
   'VerticalAlignment','baseline');
set(get(h2,'Parent'),'ZLabel',h2);
h2 = text('Parent',h1, ...
   'Color',[0 0 0], ...
   'HandleVisibility','off', ...
   'HorizontalAlignment','center', ...
   'Position',[659080.864378504 -24862.96426740577
6750.56601715402], ...
   'String','Scenario 3-D OverView', ...
   'VerticalAlignment','bottom');
set(get(h2,'Parent'),'Title',h2);
if nargout > 0, fig = h0; end
```

APPENDIX G. FUNCTION CODE update.m

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%
%%
%% Project: ASCM - Missile/Captive-Carry Simulation
%%
%% Name: update.m
%%
%% Type:FUNCTION
%%
%% Purpose: This m-file updates the initialization
%% parameters of the ASCM Digital Model
%% for the missile simulation. It is located in the
%% Graphical User Interface GUI) "Menu" and it is activated
%% when the list (popup menu) containing the odd simulation
%% numbers is pressed on.
%%
%%
%% Date Last Modified: 07/31/98
%%
%% By: LT Wagner A. de Lima Goncalves
%%
%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

numm = get(findobj(gcf,'Tag','PopupMenu1'),'Value');
% Get the index of the popupmenu and

% assign it to the variable numm

num=numm;
%Assign the numm value to num

db=[0];
%Create a single value matix to be
%used in the vector "current"


index=2*num-1;
%Create an odd index that will be used
%as a indexing parameter in the
```

```
%structure "store" to store the missile
%simulations.


po(1)=0;
%Re-initialization of the trigger time
%for the Nulka lauching


%==============================================================
%
%     Update the status radio-buttons in the GUI "Menu"
%
set(findobj(gcf,'Tag','swtsh button'),'Value',I.swtsh(num));
% Update swtsh radio-button
set(findobj(gcf,'Tag','carry button'),'Value',I.carry(num));
% Update carry radio-button
set(findobj(gcf,'Tag','nlk button'),'Value',I.nlk(num));
% Update nlk radio-button
set(findobj(gcf,'Tag','chaff button'),'Value',I.chaff(num));
% Update chaff radio-button
set(findobj(gcf,'Tag','noise button'),'Value',I.noise(num));
% Update noise radio-button


set(findobj(gcf,'Tag','seltrac
button'),'Value',I.seltrac(num));
% Update swtsh radio-button

%In this section, the radio-buttons located in the COSRO
parameters area in the GUI "Menu"
%"Menu".The logic is :
%Case 1:If there is noise in the seeker,the seeker is a
COSRO seeker and the beam shape has
%a Gaussian shape ==> set radio-button "on";
%Case 2:If there is noise in the seeker,the seeker is a
COSRO seeker and the beam shape has
%a Sinc function shape ==> set radio-button "on";
%Case 3:If there is noise in the seeker and the seeker is a
Monopulse seeker
%==> set radio-buttons "Gaussian" and  "Sinc" "off".Also in
the case ,the indication of
%"Tracker Type" will be indicating "Monopulse" on.
%For I.noise(num)==0, the status radio-button will show
noise indication as "Off".(No noise
%in the seeker).

if I.noise(num)==1 & I.seltrac(num)==0 & I.beam(num)==0
% Case 1
```

```
   set(findobj(gcf,'Tag','gaussian
button'),'Value',I.beam(num)+1);

   elseif I.noise(num)==1 & I.seltrac(num)==0 &
I.beam(num)==1   % Case 2
      set(findobj(gcf,'Tag','sinc
button'),'Value',I.beam(num));
      set(findobj(gcf,'Tag','gaussian
button'),'Value',I.beam(num)-1);
else
% Case 3
   set(findobj(gcf,'Tag','sinc
button'),'Value',I.beam(num));
   set(findobj(gcf,'Tag','gaussian
button'),'Value',I.beam(num));
end
%
%==============================================================
%
%                    Update Model Parameters
%
swtsh=I.swtsh(num);
carry=I.carry(num);
nlk=I.nlk(num);
chaff=I.chaff(num);
noise=I.noise(num);
seltrac=I.seltrac(num);
beam=I.beam(num);
ska1 = I.ska1(num);
ska2=I.ska2(num);
skv1=I.skv1(num);
skv2=I.skv2(num);
enra=I.enra(num);
enrb=I.enrb(num);
ta1=I.ta1(num);
ta2=I.ta2(num);
tb1=I.tb1(num);
tb2=I.tb2(num);
tm=I.tm(num);
tmv=I.tmv(num);
tv=I.tv(num);
ttg=I.ttg(num);
sekhlim=I.sekhlim(num);
sekvlim=I.sekvlim(num);
%
%==============================================================
%
%                  Update COSRO Seeker Parameters
%
```

```
ppc=I.ppc(num);
freqc=I.freqc(num);
antgainc=I.antgainc(num);
HPc=I.HPc(num);
noibwc=I.noibwc(num);
noifigc=I.noifigc(num);
rrc=I.rrc(num);
numpulc=I.numpulc(num);
nosangc=I.nosangc(num);
envc=I.envc(num);
nutfreqc=I.nutfreqc(num);
serbwc=I.serbwc(num);
crossc=I.crossc(num);
alphac=I.alphac(num);
%
%============================================================
%
%            Update Monopulse Seeker Parameters
%
ppm=I.ppm(num);
freqm=I.freqm(num);
antgainm=I.antgainm(num);
HPm=I.HPm(num);
noibwm=I.noibwm(num);
noifigm=I.noifigm(num);
rrm=I.rrm(num);
numpulm=I.numpulm(num);
fslrm=I.fslrm(num);
crossm=I.crossc(num);
alpham=I.alphac(num);
%
%============================================================
%
% Update the vector "current" that will be used for the
% noise generation in the
% Noise Generator Block.
%
current=[ [db([ones(1,22)])] I.ppc(num) I.freqc(num)
I.antgainc(num) I.HPc(num)...
I.noibwc(num)I.noifigc(num) I.rrc(num) I.numpulc(num)
I.nosangc(num)...
I.envc(num) I.nutfreqc(num) I.serbwc(num) I.crossc(num)
I.alphac(num)...
I.ppm(num) I.freqm(num) I.antgainm(num) I.HPm(num)
I.noibwm(num) ...
I.noifigm(num) I.rrc(num) I.numpulm(num) I.fslrm(num)
I.crossm(num)...
I.alpham(num)]';
```

APPENDIX H. FUNCTION CODE update1.m

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%
%%
%% Project: ASCM - Missile/Captive-Carry Simulation
%%
%% Name: update1.m
%%
%% Type:FUNCTION
%%
%% Purpose: This m-file updates the initialization
%% parameters of the ASCM Digital Model for the
%% Captive-Carry simulation. It is located in the
%% Graphical User Interface (GUI) "Menu" and it is activated
%% when the "Run C.C Simulation" button is pressed.
%%
%%
%% Date Last Modified: 07/31/98
%%
%% By: LT Wagner A. de Lima Goncalves
%%
%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

po(1)=0;
%Re-initilization of the trigger-time for the Nulka
%launching

index=index+1;
%Increment the indexing parameter of the "store" structure
%to store the even simulations(Captive-Carry).

I.carry(num)=0;
%Set the platform to be the captive-carry platform.

set(findobj(gcf,'Tag','carry button'),'Value',I.carry(num));
% Update radio-button status
% in the GUI "Menu"

%===========================================================

%                 Update Model Parameters
```

```
swtsh=I.swtsh(num);
carry=I.carry(num);
nlk=I.nlk(num);
chaff=I.chaff(num);
seltac=I.seltrac(num);
beam=I.beam(num);
ska1 = I.ska1(num);
ska2=I.ska2(num);
skv1=I.skv1(num);
skv2=I.skv2(num);
enra=I.enra(num);
enrb=I.enrb(num);
ta1=I.ta1(num);
ta2=I.ta2(num);
tb1=I.tb1(num);
tb2=I.tb2(num);
tm=I.tm(num);
tmv=I.tmv(num);
tv=I.tv(num);
ttg=I.ttg(num);
sekhlim=I.sekhlim(num);
sekvlim=I.sekvlim(num);
%
%============================================================
%
%             Update COSRO Seeker Parameters
%
ppc=I.ppc(num);
freqc=I.freqc(num);
antgainc=I.antgainc(num);
HPc=I.HPc(num);
noibwc=I.noibwc(num);
noifigc=I.noifigc(num);
rrc=I.rrc(num);
numpulc=I.numpulc(num);
nosangc=I.nosangc(num);
envc=I.envc(num);
nutfreqc=I.nutfreqc(num);
serbwc=I.serbwc(num);
crossc=I.crossc(num);
alphac=I.alphac(num);
%
%============================================================
%
%             Update Monopulse Seeker Parameters
%
ppm=I.ppm(num);
freqm=I.freqm(num);
antgainm=I.antgainm(num);
```

```
HPm=I.HPm(num);
noibwm=I.noibwm(num);
noifigm=I.noifigm(num);
rrm=I.rrm(num);
numpulm=I.numpulm(num);
fslrm=I.fslrm(num);
crossm=I.crossc(num);
alpham=I.alphac(num);
%
%==========================================================
% Update the vector "current" that will be used for the
% noise generation in the Noise Generator Block.
%
%

current=[ [db([ones(1,22)])] I.ppc(num) I.freqc(num)
I.antgainc(num) I.HPc(num)...
I.noibwc(num)I.noifigc(num) I.rrc(num) I.numpulc(num)
I.nosangc(num)...
I.envc(num) I.nutfreqc(num) I.serbwc(num) I.crossc(num)
I.alphac(num)...
I.ppm(num) I.freqm(num) I.antgainm(num) I.HPm(num)
I.noibwm(num) ...
I.noifigm(num) I.rrc(num) I.numpulm(num) I.fslrm(num)
I.crossm(num) I.alpham(num)]';
```

APPENDIX I. FUNCTION CODE store_simulation.m

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%
%% Project: ASCM - Missile/Captive-Carry Simulation
%%
%% Name: store_simulation.m
%%
%% Type:FUNCTION
%%
%% Purpose: This m-file stores the missile results generated
%% by the ASCM Digital Model in a Matlab structure
%% in order to construct graphs (plot1.m and plot2.)
%% which will allow simulation analysis as well as further
%% data manipulations for training, testing and
%% evaluation of Neural Networks. It is activated by
%% pressing the button "Store Data" on the GUI "Menu" in the
%% Missile frame.
%%
%% Date Last Modified: 07/31/98
%%
%% By: LT Wagner A. de Lima Goncalves
%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

mcell=cell(1,1);
miss_distance=min(min(R));
% Miss_distance calculation
mcell=miss_distance;

tcell=cell(1,1);
% Time storing for graphs
tcell=shpos(:,1);

%
%    Define cells to be used in the data structure store
%
%                           Seeker Performance Data
%
scs1=cell(1,1);
scs2=cell(1,1);
scs3=cell(1,1);
scs4=cell(1,1);
scs5=cell(1,1);
```

```
scs6=cell(1,1);
%
%                    ASCM Digital Model Parameters
%
acs1=cell(1,1);
acs2=cell(1,1);
acs3=cell(1,1);
acs4=cell(1,1);
acs5=cell(1,1);
acs6=cell(1,1);
acs7=cell(1,1);
acs8=cell(1,1);
acs9=cell(1,1);
acs10=cell(1,1);
acs11=cell(1,1);
acs12=cell(1,1);
acs13=cell(1,1);
acs14=cell(1,1);
acs15=cell(1,1);
acs16=cell(1,1);
%
%                      COSRO Seeker Parameters
%
ccs1=cell(1,1);
ccs2=cell(1,1);
ccs3=cell(1,1);
ccs4=cell(1,1);
ccs5=cell(1,1);
ccs6=cell(1,1);
ccs7=cell(1,1);
ccs8=cell(1,1);
ccs9=cell(1,1);
ccs10=cell(1,1);
ccs11=cell(1,1);
ccs12=cell(1,1);
ccs13=cell(1,1);
ccs14=cell(1,1);
ccs15=cell(1,1);
%
%                  Monopulse Seeker Parameters
%
mcs1=cell(1,1);
mcs2=cell(1,1);
mcs3=cell(1,1);
mcs4=cell(1,1);
mcs5=cell(1,1);
mcs6=cell(1,1);
mcs7=cell(1,1);
mcs8=cell(1,1);
```

```
mcs9=cell(1,1);
mcs10=cell(1,1);
mcs11=cell(1,1);
%
%                        Threat Position
%
thcs1=cell(1,1);
thcs2=cell(1,1);
thcs1=cell(1,1);
%
%                        Target Position
%
tcs1=cell(1,1);
tcs2=cell(1,1);
tcs3=cell(1,1);
%
%                                   Nulka Position
%
ncs1=cell(1,1);
ncs2=cell(1,1);
ncs3=cell(1,1);
%
%============================================================
%
%Assign values to the cells used in the data structure store
%
%                     Seeker Performance Data
%
scs1=shpos(:,2);
scs2=svpos(:,2);
scs3=shrate(:,2);
scs4=svrate(:,2);
scs5=shacc(:,2);
scs6=svacc(:,2);
%
%                ASCM Digital Model Parameters
%
acs1=I.ska1(num);
acs2=I.ska2(num);
acs3=I.skv1(num);
acs4=I.skv2(num);
acs5=I.enra(num);
acs6=I.enrb(num);
acs7=I.ta1(num);
acs8=I.ta2(num);
acs9=I.tb1(num);
acs10=I.tb2(num);
acs11=I.tm(num);
acs12=I.tmv(num);
```

```
acs13=I.tv(num);
acs14=I.ttg(num);
acs15=I.sekhlim(num);
acs16=I.sekvlim(num);
%
%                 COSRO Seeker Parameters
%
ccs1=I.ppc(num);
ccs2=I.freqc(num);
ccs3=I.antgainc(num);
ccs4=I.HPc(num);
ccs5=I.noibwc(num);
ccs6=I.noifigc(num);
ccs7=I.rrc(num);
ccs8=I.numpulc(num);
ccs9=I.nosangc(num);
ccs10=I.envc(num);
ccs11=I.nutfreqc(num);
ccs12=I.serbwc(num);
ccs13=I.crossc(num);
ccs14=I.alphac(num);
ccs15=I.beam(num);
%
%                Monopulse Seeker Parameters
%
mcs1=I.ppm(num);
mcs2=I.freqm(num);
mcs3=I.antgainm(num);
mcs4=I.HPm(num);
mcs5=I.noibwm(num);
mcs6=I.noifigm(num);
mcs7=I.rrm(num);
mcs8=I.numpulm(num);
mcs9=I.fslrm(num);
mcs10=I.crossc(num);
mcs11=I.alphac(num);
%
%                       Threat Position
%
thcs1=mxpos(:,2);
thcs2=mypos(:,2);
thcs3=mzpos(:,2);
%
%                       Target Position
%
tcs1=txpos(:,2);
tcs2=typos(:,2);
tcs3=tzpos(:,2);
%
```

```
%                      Nulka Position
%
ncs1=nxpos(:,2);
ncs2=nypos(:,2);
ncs3=nzpos(:,2);
%
%============================================================
%Structure store

store(index)=struct('miss',mcell,'time',tcell,'shpos',scs1,'
svpos',scs2,'shrate',scs3,…
'svrate',scs4,'shacc', scs5,'svacc',scs6,'ska1',acs1,...
'ska2',acs2,'skv1',acs3,'skv2',acs4,'enra',acs5,'enrb',acs6,
...
'ta1',acs7,'ta2',acs8,'tb1',acs9,'tb2',acs10,'tm',acs11,...
'tmv',acs12,'tv',acs13,'ttg',acs14,'sekhlim',acs15,...
'sekvlim',acs16,'ppc',ccs1,'freqc',ccs2,'antgainc',ccs3,...
'HPc',ccs4,'noibwc',ccs5,'noifigc',ccs6,'rrc',ccs7,'numpulc'
,ccs8,...
'nosangc',ccs9,'envc',ccs10,'nutfreqc',ccs11,...
'serbwc',ccs12,'crossc',ccs13,'alphac',ccs14,'beam',ccs15,..
'ppm',mcs1,'freqm',mcs2,'antgainm',mcs3,'HPm',mcs4,...
'noibwm',mcs5,'noifigm',mcs6,'rrm',mcs7,'numpulm',mcs8,'fslm
',mcs9,...
'crossm',mcs10,'alpham',mcs11,'mxpos',thcs1,'mypos',thcs2,..
'mzpos',thcs3,'txpos',tcs1,'typos',tcs2,'tzpos',tcs3,...
'nxpos',ncs1,'nypos',ncs2,'nzpos',ncs3);
```

APPENDIX J. FUNCTION CODE store_simulation1.m

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%
%% Project: ASCM - Missile/Captive-Carry Simulation
%%
%% Name: store_simulation1.m
%%
%% Type:FUNCTION
%%
%% Purpose: This m-file stores the captive-carry results
%% generated by the ASCM Digital Model in a Matlab structure
%% in order to construct graphs
%% (plot1.m and plot2.) which will allow  simulation
%% analysis as well as further data manipulations
%% for training, testing and evaluation of a Neural Network.
%% It is activated by pressing the button "Store Data"
%% on the GUI "Menu" in the Captive-carry frame.
%%
%% Date Last Modified: 07/31/98
%%
%% By: LT Wagner A. de Lima Goncalves
%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

mcell2=cell(1,1);
miss_distance2=min(min(R));
% Miss_distance calculation
mcell2=miss_distance2;

tcell2=cell(1,1);
% Time storing for graphs
tcell2=shpos(:,1);

%
%        Define cells to be used in the data structure store
%
%                   Seeker Performance Data
%
scs12=cell(1,1);
scs22=cell(1,1);
scs32=cell(1,1);
scs42=cell(1,1);
scs52=cell(1,1);
```

```
scs62=cell(1,1);
%
%                        ASCM Digital Model Parameters
%
acs12=cell(1,1);
acs22=cell(1,1);
acs32=cell(1,1);
acs42=cell(1,1);
acs52=cell(1,1);
acs62=cell(1,1);
acs72=cell(1,1);
acs82=cell(1,1);
acs92=cell(1,1);
acs102=cell(1,1);
acs112=cell(1,1);
acs122=cell(1,1);
acs132=cell(1,1);
acs142=cell(1,1);
acs152=cell(1,1);
acs162=cell(1,1);
%
%                          COSRO Seeker Parameters
%
ccs12=cell(1,1);
ccs22=cell(1,1);
ccs32=cell(1,1);
ccs42=cell(1,1);
ccs52=cell(1,1);
ccs62=cell(1,1);
ccs72=cell(1,1);
ccs82=cell(1,1);
ccs92=cell(1,1);
ccs102=cell(1,1);
ccs112=cell(1,1);
ccs122=cell(1,1);
ccs132=cell(1,1);
ccs142=cell(1,1);
ccs152=cell(1,1);
%
%                    Monopulse Seeker Parameters
%
mcs12=cell(1,1);
mcs22=cell(1,1);
mcs32=cell(1,1);
mcs42=cell(1,1);
mcs52=cell(1,1);
mcs62=cell(1,1);
mcs72=cell(1,1);
mcs82=cell(1,1);
```

```
mcs92=cell(1,1);
mcs102=cell(1,1);
mcs112=cell(1,1);
%
%                         Threat Position
%
thcs12=cell(1,1);
thcs22=cell(1,1);
thcs12=cell(1,1);
%
%                         Target Position
%
tcs12=cell(1,1);
tcs22=cell(1,1);
tcs32=cell(1,1);
%
%                         Nulka Position
%
ncs12=cell(1,1);
ncs22=cell(1,1);
ncs32=cell(1,1);
%
%===========================================================
%
% Assign values to the cells used in the data structure
% store
%
%                     Seeker Performance Data
%
scs12=shpos(:,2);
scs22=svpos(:,2);
scs32=shrate(:,2);
scs42=svrate(:,2);
scs52=shacc(:,2);
scs62=svacc(:,2);
%
%                ASCM Digital Model Parameters
%
acs12=I.ska1(num);
acs22=I.ska2(num);
acs32=I.skv1(num);
acs42=I.skv2(num);
acs52=I.enra(num);
acs62=I.enrb(num);
acs72=I.ta1(num);
acs82=I.ta2(num);
acs92=I.tb1(num);
acs102=I.tb2(num);
acs112=I.tm(num);
```

```
acs122=I.tmv(num);
acs132=I.tv(num);
acs142=I.ttg(num);
acs152=I.sekhlim(num);
acs162=I.sekvlim(num);
%
%                    COSRO Seeker Parameters
%
ccs12=I.ppc(num);
ccs22=I.freqc(num);
ccs32=I.antgainc(num);
ccs42=I.HPc(num);
ccs52=I.noibwc(num);
ccs62=I.noifigc(num);
ccs72=I.rrc(num);
ccs82=I.numpulc(num);
ccs92=I.nosangc(num);
ccs102=I.envc(num);
ccs112=I.nutfreqc(num);
ccs122=I.serbwc(num);
ccs132=I.crossc(num);
ccs142=I.alphac(num);
ccs152=I.beam(num);
%
%                     Monopulse Seeker Parameters
%
mcs12=I.ppm(num);
mcs22=I.freqm(num);
mcs32=I.antgainm(num);
mcs42=I.HPm(num);
mcs52=I.noibwm(num);
mcs62=I.noifigm(num);
mcs72=I.rrm(num);
mcs82=I.numpulm(num);
mcs92=I.fslrm(num);
mcs102=I.crossc(num);
mcs112=I.alphac(num);
%
%                         Threat Position
%
thcs12=mxpos(:,2);
thcs22=mypos(:,2);
thcs32=mzpos(:,2);
%
%                         Target Position
%
tcs12=txpos(:,2);
tcs22=typos(:,2);
tcs32=tzpos(:,2);
```

```
%
%                         Nulka Position
%
ncs12=nxpos(:,2);
ncs22=nypos(:,2);
ncs32=nzpos(:,2);
%
%==========================================================
%Structure store

store(index)=struct('miss',mcell2,'time',tcell2,'shpos',scs1
2,'svpos',scs22,...
'shrate',scs32,'svrate',scs42,'shacc', scs52,'svacc',scs62,…
'ska1',acs12,'ska2',acs22,'skv1',acs32,'skv2',acs42,…
'enra',acs52,'enrb',acs62,'ta1',acs72,'ta2',acs82,'tb1',acs9
2,…
'tb2',acs102,'tm',acs112,'tmv',acs122,'tv',acs132,'ttg',acs1
42,…
'sekhlim',acs152,'sekvlim',acs162,'ppc',ccs12,'freqc',ccs22,
'antgainc',ccs32,'HPc',ccs42,'noibwc',ccs52,'noifigc',ccs62,
…
'rrc',ccs72,'numpulc',ccs82,'nosangc',ccs92,'envc',ccs102,..
'nutfreqc',ccs112,'serbwc',ccs122,'crossc',ccs132,...
'alphac',ccs142,'beam',ccs152,'ppm',mcs12,'freqm',mcs22,...
'antgainm',mcs32,'HPm',mcs42,'noibwm',mcs52,'noifigm',mcs62,
…
'rrm',mcs72,'numpulm',mcs82,'fslrm',mcs92,...
'crossm',mcs102,'alpham',mcs112,'mxpos',thcs12,'mypos',thcs2
2,…
'mzpos',thcs32,'txpos',tcs12,'typos',tcs22,'tzpos',tcs32,...
'nxpos',ncs12,'nypos',ncs22,'nzpos',ncs32);

%==========================================================

I.carry(num)=1; % Set back the threat as a missile
po(1)=0;        % Re-initializtes the Nulka "trigger time"
index=index-1;  % Set back the storage index for the missile
                % simulation
```

APPENDIX K. FUNCTION CODE plot1.m

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%
%% Project: ASCM - Missile/Captive-Carry Simulation
%%
%% Name: plot1.m
%%
%% Type:FUNCTION
%%
%% Purpose: This m-file uses the values stored by the
%% function store_simulation.m for plotting the missile
%% simulation. The graphs show the missile,target,and
%% Nulka trajectory as well as the seeker
%% performance(position, angular rate and acceleration)
%% on the GUI "Simulations_plot".This function is
%% activated when the list (popup menu) is selected on the
%% GUI.
%%
%% Date Last Modified: 07/31/98
%%
%% By: LT Wagner A. de Lima Goncalves
%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%
% Assign the values stored in "store" structure at the index
% defined in the the GUI Menu(by update.m function) for the
% variables below to plot the missile simulation graphs.


paux1=store(index).mxpos;
% Store the missile x position;

paux2=store(index).mypos;
% Store the missile y position;

paux3=store(index).mzpos;
% Store the missile z position;

paux4=store(index).txpos;
% Store the target x position;

paux5=store(index).typos;
% Store the target y position;
```

```
paux6=store(index).tzpos;
% Store the target z position;

paux7=store(index).nxpos;
% Store the Nulka x position;

paux8=store(index).nypos;
% Store the Nulka y position;

paux9=store(index).nzpos;
% Store the Nulka z position;

paux10=store(index).shpos;
% Store the seeker horizontal position;

paux11=store(index).svpos;
% Store the seeker horizontal position;

paux12=store(index).shrate;
% Store the seeker horizontal rate;

paux13=store(index).svrate;
% Store the seeker vertical rate;

paux14=store(index).shacc;
% Store the seeker horizontal acceleration;

paux15=store(index).svacc;
% Store the seeker horizontal rate;

ptime=store(index).time;
% Store time of the simulation;

mdout=int2str(min(min(store(index).miss)));
% Calculate the miss-distance to be presented
% on the missile graphs.

nn=index;
%Assign the value of the current

%index (update.m) for the variable nn

V2=get(gco,'Value');
%Get the index of the graph list(popup menu)


if V2==1,
% First graph:3-D missile,target,and Nulka
% trajectories

  subplot(2,2,1)
  plot3(paux1,paux2,paux3,'r.',paux4,paux5,paux6,'m
        +',paux7,paux8,paux9,'g*')
  xlabel('x-axis')
  ylabel('y-axis')
  zlabel('z-axis')
  title( 'Scenario 3-D OverView')
  view(40,40)

elseif V2==2,
% Second graph:2-D missile,target,and Nulka
% trajectories (X-Y)

  subplot(2,2,1)
  plot(paux1,paux2,'r.',paux4,paux5,'m +',paux7,paux8,'g*')
  xlabel('x-axis')
  ylabel('y-axis')
  title(['Simulation Number:',int2str(nn),...
        '  Threat - Target Plot X-Y with Miss
Distance=',mdout,'ft'])

elseif V2==3,
% Third graph:2-D missile,target,and Nulka
% trajectories (X-Z)

  subplot(2,2,1)
  plot(paux1,paux3,'r.',paux4,paux6,'m +',paux7,paux9,'g*')
  xlabel('x-axis')
  ylabel('z-axis')
  title('Threat - Target Plot X-Z')

elseif V2==4,
% Fourth graph:Seeker Horizontal Position

  subplot(2,2,1)
  paux10=(180*paux10)/pi;
  plot(ptime,paux10)
  xlabel('time(sec)')
  ylabel('Horizontal Position(degrees)')
  title('Seeker Horizontal Position')

elseif V2==5,
% Fifth graph:Seeker Vertical Position
  subplot(2,2,1)
  paux11=(180*paux11)/pi;
  plot(ptime,paux11)
```

```
   xlabel('time(sec)')
   ylabel('Vertical Position(degrees)')
   title('Seeker Vertical Position')

elseif V2==6,
% Sixth graph:Seeker Horizontal Rate
   subplot(2,2,1)
   plot(ptime,paux12)
   xlabel('time(sec)')
   ylabel('Horizontal Rate(rad/s)')
   title('Seeker Horizontal Rate')

elseif V2==7,
% Seventh graph:Seeker Vertical Rate
   subplot(2,2,1)
   plot(ptime,paux13)
   xlabel('time(sec)')
   ylabel('Vertical Rate(rad/s)')
   title('Seeker Vertical Rate')

elseif V2==8,
% Eighth graph:Seeker Horizontal Acceleration
   subplot(2,2,1)
   plot(ptime,paux14)
   xlabel('time(sec)')
   ylabel('Horizontal Acceleration(rad/s^2)')
   title('Seeker Horizontal Acceleration')

elseif V2==9,
% Nineth graph:Seeker Vertical Acceleration
   subplot(2,2,1)
   plot(ptime,paux15)
   xlabel('time(sec)')
   ylabel('Vertical Acceleration(rad/s^2)')
   title('Seeker Vertical Acceleration')
else,
end
```

APPENDIX L. FUNCTION CODE plot2.m

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%
%% Project: ASCM - Missile/Captive-Carry Simulation
%%
%% Name: plot2.m
%%
%% Type:FUNCTION
%%
%% Purpose: This m-file uses the values stored by the
%% function store_simulation1.m for plotting the
%% captive-carry simulation. The graphs show the captive-
%% carry, target, and Nulka trajectory as well as
%% the seeker performance(position,angular rate and
%% acceleration) on the GUI "Simulations_plot".This function
%% is activated when the list (popup menu) is selected
%% on the GUI.
%%
%% Date Last Modified: 07/31/98
%%
%% By: LT Wagner A. de Lima Goncalves
%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%
% Assign the values stored in "store" structure in the index
% defined in the the GUI Menu (by update.m function)
% for the variables below to plot the missile simulation
% graphs.
%

paux12=store(index+1).mxpos;
% Store the captive-carry x position;

paux22=store(index+1).mypos;
% Store the captive-carry  y position;

paux32=store(index+1).mzpos;
% Store the captive-carry  z position;

paux42=store(index+1).txpos;
% Store the target x position;

paux52=store(index+1).typos;
% Store the target y position;
```

```
paux62=store(index+1).tzpos;
% Store the target z position;

paux72=store(index+1).nxpos;
% Store the Nulka x position;

paux82=store(index+1).nypos;
% Store the Nulka y position;

paux92=store(index+1).nzpos;
% Store the Nulka z position;

paux102=store(index+1).shpos;
% Store the seeker horizontal position;

paux112=store(index+1).svpos;
% Store the seeker horizontal position;

paux122=store(index+1).shrate;
% Store the seeker horizontal rate;

paux132=store(index+1).svrate;
% Store the seeker vertical rate;

paux142=store(index+1).shacc;
% Store the seeker horizontal acceleration;

paux152=store(index+1).svacc;
% Store the seeker horizontal rate;

ptime2=store(index+1).time;
% Store time of the simulation;

mdout2=int2str(min(min(store(index+1).miss)));
% Calculate the miss-distance to be presented
% on the captive-carry  graphs.

nn2=index;
% Assign the value of the current
% index (update.m) for the variable nn

V2=get(gco,'Value');
% Get the index of the graph list(popup menu)


if V2==1,
% First graph:3-D captive-carry ,target,and Nulka
% trajectories
```

```
  subplot(2,2,2)
  plot3(paux12,paux22,paux32,'r.',paux42,paux52,paux62,'m
        +',paux72,paux82,paux92,'g*')
  xlabel('x-axis')
  ylabel('y-axis')
  zlabel('z-axis')
  title( 'Scenario 3-D OverView')
  view(40,40)

elseif V2==2,
% Second graph:2-D captive-carry ,target,and Nulka
% trajectories (X-Y)

  subplot(2,2,2)
  plot(paux12,paux22,'r.',paux42,paux52,'m
+',paux72,paux82,'g*')
  xlabel('x-axis')
  ylabel('y-axis')
  title(['Simulation Number:',int2str(nn+1),...
        '  Threat - Target Plot X-Y with Miss
Distance=',mdout2,'ft'])

elseif V2==3,
% Third graph:2-D captive-carry ,target,and Nulka
% trajectories (X-Z)

  subplot(2,2,2)
  plot(paux12,paux32,'r.',paux42,paux62,'m
  +',paux72,paux92,'g*')
  xlabel('x-axis')
  ylabel('z-axis')
  title('Threat - Target Plot X-Z')

elseif V2==4,
% Fourth graph:Seeker Horizontal Position

  subplot(2,2,2)
  paux102=(180*paux102)/pi;
  plot(ptime2,paux102)
  xlabel('time(sec)')
  ylabel('Horizontal Position(degrees)')
  title('Seeker Horizontal Position')

elseif V2==5,
% Fifth graph:Seeker Vertical Position

  subplot(2,2,2)
  paux112=(180*paux112)/pi;
  plot(ptime2,paux112)
  xlabel('time(sec)')
  ylabel('Vertical Position(degrees)')
  title('Seeker Vertical Position')

elseif V2==6,
% Sixth graph:Seeker Horizontal Rate

  subplot(2,2,2)
  plot(ptime2,paux122)
  xlabel('time(sec)')
  ylabel('Horizontal Rate(rad/s)')
  title('Seeker Horizontal Rate')

elseif V2==7,
% Seventh graph:Seeker Vertical Rate

  subplot(2,2,2)
  plot(ptime2,paux132)
  xlabel('time(sec)')
  ylabel('Vertical Rate(rad/s)')
  title('Seeker Vertical Rate')

elseif V2==8,
% Eighth graph:Seeker Horizontal Acceleration
  subplot(2,2,2)
  plot(ptime2,paux142)
  xlabel('time(sec)')
  ylabel('Horizontal Acceleration(rad/s^2)')
  title('Seeker Horizontal Acceleration')

elseif V2==9,
% Nineth graph:Seeker Vertical Acceleration

  subplot(2,2,2)
  plot(ptime2,paux152)
  xlabel('time(sec)')
  ylabel('Vertical Acceleration(rad/s^2)')
  title('Seeker Vertical Acceleration')
else,
end
```

APPENDIX M. MISSILE SIMULATIONS I

Simulation #			General Switches							Model Parameters														
			swtsh	nlk	chaff	noise	seltrac	beam	ttg	ska1	ska2	skv1	skv2	enra	enrb	ta1	ta2	tb1	tb2	tm	tmv	tv	sekhlim	sekvlim
1	[redacted]	[redacted]	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3	[redacted]	[redacted]	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
5	[redacted]	[redacted]	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
7	[redacted]	[redacted]	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
9	[redacted]	[redacted]	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
11	[redacted]	[redacted]	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
13	[redacted]	[redacted]	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
15	[redacted]	[redacted]	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
17	[redacted]	[redacted]	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
19	[redacted]	[redacted]	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
21	[redacted]	[redacted]	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
23	[redacted]	[redacted]	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
25	[redacted]	[redacted]	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
27	[redacted]	[redacted]	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
29	[redacted]	[redacted]	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
31	[redacted]	[redacted]	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
33	[redacted]	[redacted]	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
35	[redacted]	[redacted]	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
37	[redacted]	[redacted]	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
39	[redacted]	[redacted]	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
41	[redacted]	[redacted]	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
43	[redacted]	[redacted]	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
45	[redacted]	[redacted]	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
47	[redacted]	[redacted]	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
49	[redacted]	[redacted]	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
51	[redacted]	[redacted]	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
53	[redacted]	[redacted]	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
55	[redacted]	[redacted]	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
57	[redacted]	[redacted]	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
59	[redacted]	[redacted]	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
61	[redacted]	[redacted]	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
63	[redacted]	[redacted]	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
65	[redacted]	[redacted]	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
67	[redacted]	[redacted]	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
69	[redacted]	[redacted]	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
71	[redacted]	[redacted]	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
73	[redacted]	[redacted]	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
75	[redacted]	[redacted]	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
77	[redacted]	[redacted]	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
79	[redacted]	[redacted]	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
81	[redacted]	[redacted]	1	1	0	0	0	0	2	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
83	[redacted]	[redacted]	1	1	0	0	0	0	4	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
85	[redacted]	[redacted]	1	1	0	0	0	0	6	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
87	[redacted]	[redacted]	1	1	0	0	0	0	8	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
89	[redacted]	[redacted]	1	1	0	0	0	0	10	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
91	[redacted]	[redacted]	1	1	0	0	0	0	12	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
93	[redacted]	[redacted]	1	1	0	0	0	0	14	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
95	[redacted]	[redacted]	1	1	0	0	0	0	16	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
97	[redacted]	[redacted]	1	1	0	0	0	0	18	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
99	[redacted]	[redacted]	1	1	0	0	0	0	20	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
101	[redacted]	[redacted]	1	1	0	1	0	0	2	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
103	[redacted]	[redacted]	1	1	0	1	0	0	4	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
105	[redacted]	[redacted]	1	1	0	1	0	0	6	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
107	[redacted]	[redacted]	1	1	0	1	0	0	8	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
109	[redacted]	[redacted]	1	1	0	1	0	0	10	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
111	[redacted]	[redacted]	1	1	0	1	0	0	12	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
113	[redacted]	[redacted]	1	1	0	1	0	0	14	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
115	[redacted]	[redacted]	1	1	0	1	0	0	16	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
117	[redacted]	[redacted]	1	1	0	1	0	0	18	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
119	[redacted]	[redacted]	1	1	0	1	0	0	20	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
121	[redacted]	[redacted]	1	1	0	1	0	1	2	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
123	[redacted]	[redacted]	1	1	0	1	0	1	4	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
125	[redacted]	[redacted]	1	1	0	1	0	1	6	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
127	[redacted]	[redacted]	1	1	0	1	0	1	8	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
129	[redacted]	[redacted]	1	1	0	1	0	1	10	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
131	[redacted]	[redacted]	1	1	0	1	0	1	12	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
133	[redacted]	[redacted]	1	1	0	1	0	1	14	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
135	[redacted]	[redacted]	1	1	0	1	0	1	16	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
137	[redacted]	[redacted]	1	1	0	1	0	1	18	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
139	[redacted]	[redacted]	1	1	0	1	0	1	20	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
141	[redacted]	[redacted]	1	1	0	1	1	0	2	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
143	[redacted]	[redacted]	1	1	0	1	1	0	4	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
145	[redacted]	[redacted]	1	1	0	1	1	0	6	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
147	[redacted]	[redacted]	1	1	0	1	1	0	8	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
149	[redacted]	[redacted]	1	1	0	1	1	0	10	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
151	[redacted]	[redacted]	1	1	0	1	1	0	12	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
153	[redacted]	[redacted]	1	1	0	1	1	0	14	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
155	[redacted]	[redacted]	1	1	0	1	1	0	16	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
157	[redacted]	[redacted]	1	1	0	1	1	0	18	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
159	[redacted]	[redacted]	1	1	0	1	1	0	20	0.1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
161	[redacted]	[redacted]	1	1	0	0	0	0	2	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
163	[redacted]	[redacted]	1	1	0	0	0	0	4	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
165	[redacted]	[redacted]	1	1	0	0	0	0	6	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
167	[redacted]	[redacted]	1	1	0	0	0	0	8	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
169	[redacted]	[redacted]	1	1	0	0	0	0	10	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
171	[redacted]	[redacted]	1	1	0	0	0	0	12	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
173	[redacted]	[redacted]	1	1	0	0	0	0	14	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
175	[redacted]	[redacted]	1	1	0	0	0	0	16	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
177	[redacted]	[redacted]	1	1	0	0	0	0	18	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
179	[redacted]	[redacted]	1	1	0	0	0	0	20	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
181	[redacted]	[redacted]	1	1	0	1	0	0	2	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
183	[redacted]	[redacted]	1	1	0	1	0	0	4	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
185	[redacted]	[redacted]	1	1	0	1	0	0	6	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
187	[redacted]	[redacted]	1	1	0	1	0	0	8	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
189	[redacted]	[redacted]	1	1	0	1	0	0	10	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618

191	▨	▨	1	1	0	1	0	0	12	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
193	▨	▨	1	1	0	1	0	0	14	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
195	▨	▨	1	1	0	1	0	0	16	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
197	▨	▨	1	1	0	1	0	0	18	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
199	▨	▨	1	1	0	1	0	0	20	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
201	▨	▨	1	1	0	1	0	1	2	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
203	▨	▨	1	1	0	1	0	1	4	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
205	▨	▨	1	1	0	1	0	1	6	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
207	▨	▨	1	1	0	1	0	1	8	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
209	▨	▨	1	1	0	1	0	1	10	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
211	▨	▨	1	1	0	1	0	1	12	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
213	▨	▨	1	1	0	1	0	1	14	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
215	▨	▨	1	1	0	1	0	1	16	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
217	▨	▨	1	1	0	1	0	1	18	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
219	▨	▨	1	1	0	1	0	1	20	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
221	▨	▨	1	1	0	1	1	0	2	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
223	▨	▨	1	1	0	1	1	0	4	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
225	▨	▨	1	1	0	1	1	0	6	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
227	▨	▨	1	1	0	1	1	0	8	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
229	▨	▨	1	1	0	1	1	0	10	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
231	▨	▨	1	1	0	1	1	0	12	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
233	▨	▨	1	1	0	1	1	0	14	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
235	▨	▨	1	1	0	1	1	0	16	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
237	▨	▨	1	1	0	1	1	0	18	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
239	▨	▨	1	1	0	1	1	0	20	1	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
241	▨	▨	1	1	0	0	0	0	2	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
243	▨	▨	1	1	0	0	0	0	4	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
245	▨	▨	1	1	0	0	0	0	6	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
247	▨	▨	1	1	0	0	0	0	8	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
249	▨	▨	1	1	0	0	0	0	10	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
251	▨	▨	1	1	0	0	0	0	12	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
253	▨	▨	1	1	0	0	0	0	14	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
255	▨	▨	1	1	0	0	0	0	16	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
257	▨	▨	1	1	0	0	0	0	18	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
259	▨	▨	1	1	0	0	0	0	20	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
261	▨	▨	1	1	0	1	0	0	2	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
263	▨	▨	1	1	0	1	0	0	4	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
265	▨	▨	1	1	0	1	0	0	6	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
267	▨	▨	1	1	0	1	0	0	8	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
269	▨	▨	1	1	0	1	0	0	10	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
271	▨	▨	1	1	0	1	0	0	12	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
273	▨	▨	1	1	0	1	0	0	14	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
275	▨	▨	1	1	0	1	0	0	16	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
277	▨	▨	1	1	0	1	0	0	18	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
279	▨	▨	1	1	0	1	0	0	20	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
281	▨	▨	1	1	0	1	0	1	2	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
283	▨	▨	1	1	0	1	0	1	4	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
285	▨	▨	1	1	0	1	0	1	6	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
287	▨	▨	1	1	0	1	0	1	8	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
289	▨	▨	1	1	0	1	0	1	10	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
291	▨	▨	1	1	0	1	0	1	12	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
293	▨	▨	1	1	0	1	0	1	14	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
295	▨	▨	1	1	0	1	0	1	16	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
297	▨	▨	1	1	0	1	0	1	18	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
299	▨	▨	1	1	0	1	0	1	20	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
301	▨	▨	1	1	0	1	1	0	2	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
303	▨	▨	1	1	0	1	1	0	4	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
305	▨	▨	1	1	0	1	1	0	6	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
307	▨	▨	1	1	0	1	1	0	8	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
309	▨	▨	1	1	0	1	1	0	10	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
311	▨	▨	1	1	0	1	1	0	12	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
313	▨	▨	1	1	0	1	1	0	14	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
315	▨	▨	1	1	0	1	1	0	16	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
317	▨	▨	1	1	0	1	1	0	18	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
319	▨	▨	1	1	0	1	1	0	20	4	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
321	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
323	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
325	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
327	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
329	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
331	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
333	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
335	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
337	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
339	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
341	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
343	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
345	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
347	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
349	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
351	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
353	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
355	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
357	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
359	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
361	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
363	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
365	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
367	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
369	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
371	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
373	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
375	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
377	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
379	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
381	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
383	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
385	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
387	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618

389	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
391	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
393	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
395	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
397	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
399	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
401	▨	▨	1	1	0	0	0	0	2	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
403	▨	▨	1	1	0	0	0	0	4	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
405	▨	▨	1	1	0	0	0	0	6	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
407	▨	▨	1	1	0	0	0	0	8	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
409	▨	▨	1	1	0	0	0	0	10	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
411	▨	▨	1	1	0	0	0	0	12	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
413	▨	▨	1	1	0	0	0	0	14	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
415	▨	▨	1	1	0	0	0	0	16	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
417	▨	▨	1	1	0	0	0	0	18	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
419	▨	▨	1	1	0	0	0	0	20	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
421	▨	▨	1	1	0	1	0	0	2	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
423	▨	▨	1	1	0	1	0	0	4	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
425	▨	▨	1	1	0	1	0	0	6	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
427	▨	▨	1	1	0	1	0	0	8	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
429	▨	▨	1	1	0	1	0	0	10	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
431	▨	▨	1	1	0	1	0	0	12	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
433	▨	▨	1	1	0	1	0	0	14	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
435	▨	▨	1	1	0	1	0	0	16	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
437	▨	▨	1	1	0	1	0	0	18	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
439	▨	▨	1	1	0	1	0	0	20	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
441	▨	▨	1	1	0	1	0	1	2	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
443	▨	▨	1	1	0	1	0	1	4	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
445	▨	▨	1	1	0	1	0	1	6	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
447	▨	▨	1	1	0	1	0	1	8	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
449	▨	▨	1	1	0	1	0	1	10	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
451	▨	▨	1	1	0	1	0	1	12	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
453	▨	▨	1	1	0	1	0	1	14	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
455	▨	▨	1	1	0	1	0	1	16	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
457	▨	▨	1	1	0	1	0	1	18	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
459	▨	▨	1	1	0	1	0	1	20	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
461	▨	▨	1	1	0	1	1	0	2	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
463	▨	▨	1	1	0	1	1	0	4	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
465	▨	▨	1	1	0	1	1	0	6	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
467	▨	▨	1	1	0	1	1	0	8	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
469	▨	▨	1	1	0	1	1	0	10	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
471	▨	▨	1	1	0	1	1	0	12	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
473	▨	▨	1	1	0	1	1	0	14	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
475	▨	▨	1	1	0	1	1	0	16	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
477	▨	▨	1	1	0	1	1	0	18	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
479	▨	▨	1	1	0	1	1	0	20	0.25	0.1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
481	▨	▨	1	1	0	0	0	0	2	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
483	▨	▨	1	1	0	0	0	0	4	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
485	▨	▨	1	1	0	0	0	0	6	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
487	▨	▨	1	1	0	0	0	0	8	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
489	▨	▨	1	1	0	0	0	0	10	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
491	▨	▨	1	1	0	0	0	0	12	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
493	▨	▨	1	1	0	0	0	0	14	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
495	▨	▨	1	1	0	0	0	0	16	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
497	▨	▨	1	1	0	0	0	0	18	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
499	▨	▨	1	1	0	0	0	0	20	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
501	▨	▨	1	1	0	1	0	0	2	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
503	▨	▨	1	1	0	1	0	0	4	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
505	▨	▨	1	1	0	1	0	0	6	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
507	▨	▨	1	1	0	1	0	0	8	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
509	▨	▨	1	1	0	1	0	0	10	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
511	▨	▨	1	1	0	1	0	0	12	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
513	▨	▨	1	1	0	1	0	0	14	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
515	▨	▨	1	1	0	1	0	0	16	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
517	▨	▨	1	1	0	1	0	0	18	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
519	▨	▨	1	1	0	1	0	0	20	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
521	▨	▨	1	1	0	1	0	1	2	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
523	▨	▨	1	1	0	1	0	1	4	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
525	▨	▨	1	1	0	1	0	1	6	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
527	▨	▨	1	1	0	1	0	1	8	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
529	▨	▨	1	1	0	1	0	1	10	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
531	▨	▨	1	1	0	1	0	1	12	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
533	▨	▨	1	1	0	1	0	1	14	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
535	▨	▨	1	1	0	1	0	1	16	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
537	▨	▨	1	1	0	1	0	1	18	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
539	▨	▨	1	1	0	1	0	1	20	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
541	▨	▨	1	1	0	1	1	0	2	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
543	▨	▨	1	1	0	1	1	0	4	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
545	▨	▨	1	1	0	1	1	0	6	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
547	▨	▨	1	1	0	1	1	0	8	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
549	▨	▨	1	1	0	1	1	0	10	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
551	▨	▨	1	1	0	1	1	0	12	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
553	▨	▨	1	1	0	1	1	0	14	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
555	▨	▨	1	1	0	1	1	0	16	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
557	▨	▨	1	1	0	1	1	0	18	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
559	▨	▨	1	1	0	1	1	0	20	0.25	1	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
561	▨	▨	1	1	0	0	0	0	2	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
563	▨	▨	1	1	0	0	0	0	4	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
565	▨	▨	1	1	0	0	0	0	6	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
567	▨	▨	1	1	0	0	0	0	8	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
569	▨	▨	1	1	0	0	0	0	10	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
571	▨	▨	1	1	0	0	0	0	12	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
573	▨	▨	1	1	0	0	0	0	14	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
575	▨	▨	1	1	0	0	0	0	16	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
577	▨	▨	1	1	0	0	0	0	18	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
579	▨	▨	1	1	0	0	0	0	20	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
581	▨	▨	1	1	0	1	0	0	2	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
583	▨	▨	1	1	0	1	0	0	4	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
585	▨	▨	1	1	0	1	0	0	6	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618

587	▨	▨	1	1	0	1	0	0	8	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
589	▨	▨	1	1	0	1	0	0	10	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
591	▨	▨	1	1	0	1	0	0	12	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
593	▨	▨	1	1	0	1	0	0	14	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
595	▨	▨	1	1	0	1	0	0	16	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
597	▨	▨	1	1	0	1	0	0	18	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
599	▨	▨	1	1	0	1	0	0	20	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
601	▨	▨	1	1	0	1	0	1	2	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
603	▨	▨	1	1	0	1	0	1	4	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
605	▨	▨	1	1	0	1	0	1	6	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
607	▨	▨	1	1	0	1	0	1	8	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
609	▨	▨	1	1	0	1	0	1	10	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
611	▨	▨	1	1	0	1	0	1	12	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
613	▨	▨	1	1	0	1	0	1	14	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
615	▨	▨	1	1	0	1	0	1	16	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
617	▨	▨	1	1	0	1	0	1	18	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
619	▨	▨	1	1	0	1	0	1	20	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
621	▨	▨	1	1	0	1	1	0	2	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
623	▨	▨	1	1	0	1	1	0	4	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
625	▨	▨	1	1	0	1	1	0	6	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
627	▨	▨	1	1	0	1	1	0	8	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
629	▨	▨	1	1	0	1	1	0	10	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
631	▨	▨	1	1	0	1	1	0	12	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
633	▨	▨	1	1	0	1	1	0	14	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
635	▨	▨	1	1	0	1	1	0	16	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
637	▨	▨	1	1	0	1	1	0	18	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
639	▨	▨	1	1	0	1	1	0	20	0.25	4	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
641	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
643	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
645	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
647	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
649	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
651	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
653	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
655	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
657	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
659	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
661	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
663	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
665	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
667	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
669	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
671	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
673	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
675	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
677	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
679	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
681	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
683	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
685	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
687	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
689	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
691	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
693	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
695	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
697	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
699	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
701	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
703	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
705	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
707	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
709	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
711	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
713	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
715	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
717	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
719	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
721	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
723	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
725	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
727	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
729	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
731	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
733	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
735	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
737	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
739	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
741	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
743	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
745	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
747	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
749	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
751	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
753	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
755	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
757	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
759	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
761	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
763	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
765	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
767	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
769	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
771	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
773	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
775	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
777	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
779	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
781	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
783	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618

785			1	1	0	1	1	0	6	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
787			1	1	0	1	1	0	8	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
789			1	1	0	1	1	0	10	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
791			1	1	0	1	1	0	12	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
793			1	1	0	1	1	0	14	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
795			1	1	0	1	1	0	16	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
797			1	1	0	1	1	0	18	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
799			1	1	0	1	1	0	20	0.25	0.25	0.1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
801			1	1	0	0	0	0	2	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
803			1	1	0	0	0	0	4	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
805			1	1	0	0	0	0	6	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
807			1	1	0	0	0	0	8	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
809			1	1	0	0	0	0	10	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
811			1	1	0	0	0	0	12	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
813			1	1	0	0	0	0	14	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
815			1	1	0	0	0	0	16	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
817			1	1	0	0	0	0	18	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
819			1	1	0	0	0	0	20	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
821			1	1	0	1	0	0	2	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
823			1	1	0	1	0	0	4	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
825			1	1	0	1	0	0	6	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
827			1	1	0	1	0	0	8	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
829			1	1	0	1	0	0	10	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
831			1	1	0	1	0	0	12	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
833			1	1	0	1	0	0	14	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
835			1	1	0	1	0	0	16	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
837			1	1	0	1	0	0	18	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
839			1	1	0	1	0	0	20	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
841			1	1	0	1	0	1	2	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
843			1	1	0	1	0	1	4	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
845			1	1	0	1	0	1	6	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
847			1	1	0	1	0	1	8	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
849			1	1	0	1	0	1	10	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
851			1	1	0	1	0	1	12	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
853			1	1	0	1	0	1	14	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
855			1	1	0	1	0	1	16	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
857			1	1	0	1	0	1	18	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
859			1	1	0	1	0	1	20	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
861			1	1	0	1	1	0	2	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
863			1	1	0	1	1	0	4	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
865			1	1	0	1	1	0	6	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
867			1	1	0	1	1	0	8	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
869			1	1	0	1	1	0	10	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
871			1	1	0	1	1	0	12	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
873			1	1	0	1	1	0	14	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
875			1	1	0	1	1	0	16	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
877			1	1	0	1	1	0	18	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
879			1	1	0	1	1	0	20	0.25	0.25	1	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
881			1	1	0	0	0	0	2	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
883			1	1	0	0	0	0	4	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
885			1	1	0	0	0	0	6	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
887			1	1	0	0	0	0	8	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
889			1	1	0	0	0	0	10	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
891			1	1	0	0	0	0	12	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
893			1	1	0	0	0	0	14	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
895			1	1	0	0	0	0	16	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
897			1	1	0	0	0	0	18	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
899			1	1	0	0	0	0	20	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
901			1	1	0	1	0	0	2	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
903			1	1	0	1	0	0	4	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
905			1	1	0	1	0	0	6	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
907			1	1	0	1	0	0	8	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
909			1	1	0	1	0	0	10	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
911			1	1	0	1	0	0	12	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
913			1	1	0	1	0	0	14	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
915			1	1	0	1	0	0	16	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
917			1	1	0	1	0	0	18	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
919			1	1	0	1	0	0	20	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
921			1	1	0	1	0	1	2	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
923			1	1	0	1	0	1	4	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
925			1	1	0	1	0	1	6	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
927			1	1	0	1	0	1	8	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
929			1	1	0	1	0	1	10	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
931			1	1	0	1	0	1	12	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
933			1	1	0	1	0	1	14	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
935			1	1	0	1	0	1	16	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
937			1	1	0	1	0	1	18	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
939			1	1	0	1	0	1	20	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
941			1	1	0	1	1	0	2	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
943			1	1	0	1	1	0	4	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
945			1	1	0	1	1	0	6	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
947			1	1	0	1	1	0	8	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
949			1	1	0	1	1	0	10	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
951			1	1	0	1	1	0	12	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
953			1	1	0	1	1	0	14	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
955			1	1	0	1	1	0	16	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
957			1	1	0	1	1	0	18	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
959			1	1	0	1	1	0	20	0.25	0.25	4	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
961			1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
963			1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
965			1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
967			1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
969			1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
971			1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
973			1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
975			1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
977			1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
979			1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
981			1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618

983	[redacted]	[redacted]	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
985	[redacted]	[redacted]	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
987	[redacted]	[redacted]	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
989	[redacted]	[redacted]	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
991	[redacted]	[redacted]	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
993	[redacted]	[redacted]	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
995	[redacted]	[redacted]	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
997	[redacted]	[redacted]	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
999	[redacted]	[redacted]	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1001	[redacted]	[redacted]	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1003	[redacted]	[redacted]	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1005	[redacted]	[redacted]	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1007	[redacted]	[redacted]	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1009	[redacted]	[redacted]	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1011	[redacted]	[redacted]	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1013	[redacted]	[redacted]	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1015	[redacted]	[redacted]	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1017	[redacted]	[redacted]	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1019	[redacted]	[redacted]	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1021	[redacted]	[redacted]	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1023	[redacted]	[redacted]	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1025	[redacted]	[redacted]	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1027	[redacted]	[redacted]	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1029	[redacted]	[redacted]	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1031	[redacted]	[redacted]	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1033	[redacted]	[redacted]	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1035	[redacted]	[redacted]	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1037	[redacted]	[redacted]	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1039	[redacted]	[redacted]	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1041	[redacted]	[redacted]	1	1	0	0	0	0	2	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1043	[redacted]	[redacted]	1	1	0	0	0	0	4	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1045	[redacted]	[redacted]	1	1	0	0	0	0	6	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1047	[redacted]	[redacted]	1	1	0	0	0	0	8	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1049	[redacted]	[redacted]	1	1	0	0	0	0	10	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1051	[redacted]	[redacted]	1	1	0	0	0	0	12	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1053	[redacted]	[redacted]	1	1	0	0	0	0	14	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1055	[redacted]	[redacted]	1	1	0	0	0	0	16	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1057	[redacted]	[redacted]	1	1	0	0	0	0	18	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1059	[redacted]	[redacted]	1	1	0	0	0	0	20	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1061	[redacted]	[redacted]	1	1	0	1	0	0	2	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1063	[redacted]	[redacted]	1	1	0	1	0	0	4	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1065	[redacted]	[redacted]	1	1	0	1	0	0	6	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1067	[redacted]	[redacted]	1	1	0	1	0	0	8	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1069	[redacted]	[redacted]	1	1	0	1	0	0	10	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1071	[redacted]	[redacted]	1	1	0	1	0	0	12	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1073	[redacted]	[redacted]	1	1	0	1	0	0	14	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1075	[redacted]	[redacted]	1	1	0	1	0	0	16	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1077	[redacted]	[redacted]	1	1	0	1	0	0	18	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1079	[redacted]	[redacted]	1	1	0	1	0	0	20	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1081	[redacted]	[redacted]	1	1	0	1	0	1	2	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1083	[redacted]	[redacted]	1	1	0	1	0	1	4	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1085	[redacted]	[redacted]	1	1	0	1	0	1	6	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1087	[redacted]	[redacted]	1	1	0	1	0	1	8	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1089	[redacted]	[redacted]	1	1	0	1	0	1	10	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1091	[redacted]	[redacted]	1	1	0	1	0	1	12	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1093	[redacted]	[redacted]	1	1	0	1	0	1	14	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1095	[redacted]	[redacted]	1	1	0	1	0	1	16	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1097	[redacted]	[redacted]	1	1	0	1	0	1	18	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1099	[redacted]	[redacted]	1	1	0	1	0	1	20	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1101	[redacted]	[redacted]	1	1	0	1	1	0	2	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1103	[redacted]	[redacted]	1	1	0	1	1	0	4	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1105	[redacted]	[redacted]	1	1	0	1	1	0	6	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1107	[redacted]	[redacted]	1	1	0	1	1	0	8	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1109	[redacted]	[redacted]	1	1	0	1	1	0	10	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1111	[redacted]	[redacted]	1	1	0	1	1	0	12	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1113	[redacted]	[redacted]	1	1	0	1	1	0	14	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1115	[redacted]	[redacted]	1	1	0	1	1	0	16	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1117	[redacted]	[redacted]	1	1	0	1	1	0	18	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1119	[redacted]	[redacted]	1	1	0	1	1	0	20	0.25	0.25	0.25	0.1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1121	[redacted]	[redacted]	1	1	0	0	0	0	2	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1123	[redacted]	[redacted]	1	1	0	0	0	0	4	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1125	[redacted]	[redacted]	1	1	0	0	0	0	6	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1127	[redacted]	[redacted]	1	1	0	0	0	0	8	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1129	[redacted]	[redacted]	1	1	0	0	0	0	10	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1131	[redacted]	[redacted]	1	1	0	0	0	0	12	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1133	[redacted]	[redacted]	1	1	0	0	0	0	14	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1135	[redacted]	[redacted]	1	1	0	0	0	0	16	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1137	[redacted]	[redacted]	1	1	0	0	0	0	18	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1139	[redacted]	[redacted]	1	1	0	0	0	0	20	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1141	[redacted]	[redacted]	1	1	0	1	0	0	2	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1143	[redacted]	[redacted]	1	1	0	1	0	0	4	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1145	[redacted]	[redacted]	1	1	0	1	0	0	6	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1147	[redacted]	[redacted]	1	1	0	1	0	0	8	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1149	[redacted]	[redacted]	1	1	0	1	0	0	10	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1151	[redacted]	[redacted]	1	1	0	1	0	0	12	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1153	[redacted]	[redacted]	1	1	0	1	0	0	14	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1155	[redacted]	[redacted]	1	1	0	1	0	0	16	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1157	[redacted]	[redacted]	1	1	0	1	0	0	18	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1159	[redacted]	[redacted]	1	1	0	1	0	0	20	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1161	[redacted]	[redacted]	1	1	0	1	0	1	2	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1163	[redacted]	[redacted]	1	1	0	1	0	1	4	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1165	[redacted]	[redacted]	1	1	0	1	0	1	6	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1167	[redacted]	[redacted]	1	1	0	1	0	1	8	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1169	[redacted]	[redacted]	1	1	0	1	0	1	10	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1171	[redacted]	[redacted]	1	1	0	1	0	1	12	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1173	[redacted]	[redacted]	1	1	0	1	0	1	14	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1175	[redacted]	[redacted]	1	1	0	1	0	1	16	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1177	[redacted]	[redacted]	1	1	0	1	0	1	18	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1179	[redacted]	[redacted]	1	1	0	1	0	1	20	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618

1181	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1183	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1185	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1187	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1189	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1191	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1193	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1195	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1197	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1199	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	1	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1201	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1203	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1205	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1207	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1209	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1211	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1213	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1215	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1217	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1219	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1221	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1223	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1225	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1227	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1229	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1231	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1233	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1235	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1237	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1239	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1241	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1243	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1245	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1247	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1249	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1251	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1253	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1255	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1257	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1259	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1261	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1263	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1265	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1267	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1269	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1271	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1273	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1275	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1277	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1279	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1281	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1283	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1285	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1287	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1289	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1291	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1293	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1295	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1297	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1299	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1301	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1303	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1305	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1307	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1309	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1311	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1313	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1315	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1317	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1319	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1321	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1323	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1325	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1327	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1329	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1331	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1333	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1335	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1337	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1339	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1341	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1343	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1345	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1347	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1349	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1351	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1353	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1355	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1357	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1359	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	1	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1361	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1363	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1365	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1367	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1369	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1371	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1373	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1375	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1377	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618

1379	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1381	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1383	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1385	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1387	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1389	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1391	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1393	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1395	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1397	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1399	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1401	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1403	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1405	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1407	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1409	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1411	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1413	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1415	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1417	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1419	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1421	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1423	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1425	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1427	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1429	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1431	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1433	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1435	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1437	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1439	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	2	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1441	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1443	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1445	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1447	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1449	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1451	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1453	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1455	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1457	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1459	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1461	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1463	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1465	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1467	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1469	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1471	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1473	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1475	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1477	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1479	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1481	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1483	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1485	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1487	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1489	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1491	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1493	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1495	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1497	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1499	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1501	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1503	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1505	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1507	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1509	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1511	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1513	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1515	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1517	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1519	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1521	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1523	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1525	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1527	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1529	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1531	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1533	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1535	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1537	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1539	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1541	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1543	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1545	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1547	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1549	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1551	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1553	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1555	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1557	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1559	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1561	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1563	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1565	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1567	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1569	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1571	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1573	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1575	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618

1577	[illegible]	[illegible]	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1579	[illegible]	[illegible]	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1581	[illegible]	[illegible]	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1583	[illegible]	[illegible]	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1585	[illegible]	[illegible]	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1587	[illegible]	[illegible]	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1589	[illegible]	[illegible]	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1591	[illegible]	[illegible]	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1593	[illegible]	[illegible]	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1595	[illegible]	[illegible]	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1597	[illegible]	[illegible]	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1599	[illegible]	[illegible]	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	8	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1601	[illegible]	[illegible]	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1603	[illegible]	[illegible]	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1605	[illegible]	[illegible]	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1607	[illegible]	[illegible]	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1609	[illegible]	[illegible]	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1611	[illegible]	[illegible]	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1613	[illegible]	[illegible]	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1615	[illegible]	[illegible]	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1617	[illegible]	[illegible]	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1619	[illegible]	[illegible]	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1621	[illegible]	[illegible]	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1623	[illegible]	[illegible]	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1625	[illegible]	[illegible]	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1627	[illegible]	[illegible]	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1629	[illegible]	[illegible]	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1631	[illegible]	[illegible]	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1633	[illegible]	[illegible]	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1635	[illegible]	[illegible]	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1637	[illegible]	[illegible]	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1639	[illegible]	[illegible]	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1641	[illegible]	[illegible]	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1643	[illegible]	[illegible]	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1645	[illegible]	[illegible]	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1647	[illegible]	[illegible]	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1649	[illegible]	[illegible]	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1651	[illegible]	[illegible]	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1653	[illegible]	[illegible]	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1655	[illegible]	[illegible]	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1657	[illegible]	[illegible]	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1659	[illegible]	[illegible]	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1661	[illegible]	[illegible]	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1663	[illegible]	[illegible]	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1665	[illegible]	[illegible]	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1667	[illegible]	[illegible]	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1669	[illegible]	[illegible]	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1671	[illegible]	[illegible]	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1673	[illegible]	[illegible]	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1675	[illegible]	[illegible]	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1677	[illegible]	[illegible]	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1679	[illegible]	[illegible]	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	1	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1681	[illegible]	[illegible]	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1683	[illegible]	[illegible]	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1685	[illegible]	[illegible]	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1687	[illegible]	[illegible]	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1689	[illegible]	[illegible]	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1691	[illegible]	[illegible]	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1693	[illegible]	[illegible]	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1695	[illegible]	[illegible]	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1697	[illegible]	[illegible]	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1699	[illegible]	[illegible]	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1701	[illegible]	[illegible]	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1703	[illegible]	[illegible]	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1705	[illegible]	[illegible]	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1707	[illegible]	[illegible]	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1709	[illegible]	[illegible]	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1711	[illegible]	[illegible]	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1713	[illegible]	[illegible]	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1715	[illegible]	[illegible]	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1717	[illegible]	[illegible]	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1719	[illegible]	[illegible]	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1721	[illegible]	[illegible]	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1723	[illegible]	[illegible]	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1725	[illegible]	[illegible]	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1727	[illegible]	[illegible]	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1729	[illegible]	[illegible]	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1731	[illegible]	[illegible]	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1733	[illegible]	[illegible]	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1735	[illegible]	[illegible]	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1737	[illegible]	[illegible]	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1739	[illegible]	[illegible]	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1741	[illegible]	[illegible]	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1743	[illegible]	[illegible]	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1745	[illegible]	[illegible]	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1747	[illegible]	[illegible]	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1749	[illegible]	[illegible]	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1751	[illegible]	[illegible]	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1753	[illegible]	[illegible]	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1755	[illegible]	[illegible]	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1757	[illegible]	[illegible]	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1759	[illegible]	[illegible]	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	2	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1761	[illegible]	[illegible]	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1763	[illegible]	[illegible]	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1765	[illegible]	[illegible]	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1767	[illegible]	[illegible]	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1769	[illegible]	[illegible]	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1771	[illegible]	[illegible]	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1773	[illegible]	[illegible]	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618

1775	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1777	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1779	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1781	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1783	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1785	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1787	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1789	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1791	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1793	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1795	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1797	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1799	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1801	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1803	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1805	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1807	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1809	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1811	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1813	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1815	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1817	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1819	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1821	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1823	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1825	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1827	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1829	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1831	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1833	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1835	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1837	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1839	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1841	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1843	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1845	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1847	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1849	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1851	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1853	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1855	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1857	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1859	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1861	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1863	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1865	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1867	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1869	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1871	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1873	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1875	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1877	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1879	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1881	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1883	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1885	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1887	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1889	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1891	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1893	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1895	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1897	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1899	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1901	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1903	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1905	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1907	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1909	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1911	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1913	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1915	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1917	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1919	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	8	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1921	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1923	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1925	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1927	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1929	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1931	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1933	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1935	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1937	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1939	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1941	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1943	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1945	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1947	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1949	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1951	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1953	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1955	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1957	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1959	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1961	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1963	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1965	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1967	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1969	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1971	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618

1973	[redacted]	[redacted]	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1975	[redacted]	[redacted]	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1977	[redacted]	[redacted]	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1979	[redacted]	[redacted]	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1981	[redacted]	[redacted]	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1983	[redacted]	[redacted]	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1985	[redacted]	[redacted]	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1987	[redacted]	[redacted]	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1989	[redacted]	[redacted]	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1991	[redacted]	[redacted]	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1993	[redacted]	[redacted]	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1995	[redacted]	[redacted]	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1997	[redacted]	[redacted]	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
1999	[redacted]	[redacted]	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.25	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2001	[redacted]	[redacted]	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2003	[redacted]	[redacted]	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2005	[redacted]	[redacted]	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2007	[redacted]	[redacted]	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2009	[redacted]	[redacted]	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2011	[redacted]	[redacted]	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2013	[redacted]	[redacted]	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2015	[redacted]	[redacted]	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2017	[redacted]	[redacted]	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2019	[redacted]	[redacted]	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2021	[redacted]	[redacted]	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2023	[redacted]	[redacted]	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2025	[redacted]	[redacted]	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2027	[redacted]	[redacted]	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2029	[redacted]	[redacted]	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2031	[redacted]	[redacted]	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2033	[redacted]	[redacted]	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2035	[redacted]	[redacted]	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2037	[redacted]	[redacted]	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2039	[redacted]	[redacted]	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2041	[redacted]	[redacted]	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2043	[redacted]	[redacted]	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2045	[redacted]	[redacted]	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2047	[redacted]	[redacted]	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2049	[redacted]	[redacted]	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2051	[redacted]	[redacted]	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2053	[redacted]	[redacted]	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2055	[redacted]	[redacted]	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2057	[redacted]	[redacted]	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2059	[redacted]	[redacted]	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2061	[redacted]	[redacted]	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2063	[redacted]	[redacted]	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2065	[redacted]	[redacted]	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2067	[redacted]	[redacted]	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2069	[redacted]	[redacted]	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2071	[redacted]	[redacted]	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2073	[redacted]	[redacted]	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2075	[redacted]	[redacted]	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2077	[redacted]	[redacted]	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2079	[redacted]	[redacted]	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2081	[redacted]	[redacted]	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2083	[redacted]	[redacted]	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2085	[redacted]	[redacted]	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2087	[redacted]	[redacted]	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2089	[redacted]	[redacted]	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2091	[redacted]	[redacted]	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2093	[redacted]	[redacted]	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2095	[redacted]	[redacted]	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2097	[redacted]	[redacted]	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2099	[redacted]	[redacted]	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2101	[redacted]	[redacted]	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2103	[redacted]	[redacted]	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2105	[redacted]	[redacted]	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2107	[redacted]	[redacted]	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2109	[redacted]	[redacted]	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2111	[redacted]	[redacted]	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2113	[redacted]	[redacted]	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2115	[redacted]	[redacted]	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2117	[redacted]	[redacted]	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2119	[redacted]	[redacted]	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2121	[redacted]	[redacted]	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2123	[redacted]	[redacted]	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2125	[redacted]	[redacted]	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2127	[redacted]	[redacted]	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2129	[redacted]	[redacted]	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2131	[redacted]	[redacted]	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2133	[redacted]	[redacted]	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2135	[redacted]	[redacted]	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2137	[redacted]	[redacted]	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2139	[redacted]	[redacted]	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2141	[redacted]	[redacted]	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2143	[redacted]	[redacted]	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2145	[redacted]	[redacted]	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2147	[redacted]	[redacted]	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2149	[redacted]	[redacted]	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2151	[redacted]	[redacted]	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2153	[redacted]	[redacted]	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2155	[redacted]	[redacted]	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2157	[redacted]	[redacted]	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2159	[redacted]	[redacted]	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	1	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2161	[redacted]	[redacted]	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2163	[redacted]	[redacted]	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2165	[redacted]	[redacted]	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2167	[redacted]	[redacted]	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2169	[redacted]	[redacted]	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618

2171	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2173	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2175	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2177	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2179	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2181	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2183	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2185	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2187	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2189	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2191	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2193	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2195	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2197	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2199	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2201	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2203	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2205	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2207	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2209	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2211	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2213	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2215	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2217	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2219	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2221	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2223	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2225	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2227	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2229	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2231	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2233	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2235	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2237	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2239	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	4	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2241	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2243	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2245	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2247	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2249	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2251	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2253	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2255	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2257	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2259	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2261	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2263	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2265	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2267	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2269	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2271	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2273	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2275	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2277	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2279	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2281	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2283	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2285	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2287	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2289	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2291	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2293	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2295	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2297	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2299	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2301	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2303	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2305	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2307	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2309	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2311	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2313	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2315	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2317	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2319	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.25	0.5	0.5	2	2	0.5	0.2618	0.2618
2321	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2323	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2325	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2327	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2329	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2331	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2333	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2335	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2337	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2339	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2341	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2343	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2345	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2347	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2349	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2351	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2353	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2355	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2357	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2359	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2361	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2363	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2365	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2367	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618

2369	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2371	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2373	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2375	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2377	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2379	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2381	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2383	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2385	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2387	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2389	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2391	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2393	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2395	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2397	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2399	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2401	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2403	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2405	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2407	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2409	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2411	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2413	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2415	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2417	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2419	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2421	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2423	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2425	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2427	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2429	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2431	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2433	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2435	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2437	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2439	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2441	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2443	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2445	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2447	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2449	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2451	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2453	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2455	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2457	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2459	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2461	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2463	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2465	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2467	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2469	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2471	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2473	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2475	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2477	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2479	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	1	0.5	0.5	2	2	0.5	0.2618	0.2618
2481	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2483	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2485	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2487	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2489	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2491	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2493	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2495	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2497	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2499	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2501	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2503	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2505	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2507	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2509	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2511	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2513	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2515	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2517	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2519	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2521	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2523	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2525	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2527	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2529	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2531	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2533	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2535	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2537	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2539	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2541	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2543	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2545	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2547	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2549	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2551	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2553	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2555	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2557	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2559	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	4	0.5	0.5	2	2	0.5	0.2618	0.2618
2561	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2563	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2565	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618

2567			1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2569			1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2571			1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2573			1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2575			1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2577			1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2579			1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2581			1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2583			1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2585			1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2587			1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2589			1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2591			1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2593			1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2595			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2597			1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2599			1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2601			1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2603			1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2605			1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2607			1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2609			1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2611			1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2613			1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2615			1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2617			1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2619			1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2621			1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2623			1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2625			1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2627			1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2629			1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2631			1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2633			1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2635			1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2637			1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2639			1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.25	0.5	2	2	0.5	0.2618	0.2618
2641			1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2643			1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2645			1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2647			1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2649			1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2651			1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2653			1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2655			1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2657			1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2659			1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2661			1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2663			1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2665			1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2667			1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2669			1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2671			1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2673			1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2675			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2677			1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2679			1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2681			1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2683			1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2685			1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2687			1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2689			1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2691			1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2693			1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2695			1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2697			1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2699			1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2701			1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2703			1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2705			1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2707			1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2709			1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2711			1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2713			1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2715			1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2717			1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2719			1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2721			1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2723			1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2725			1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2727			1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2729			1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2731			1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2733			1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2735			1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2737			1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2739			1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2741			1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2743			1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2745			1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2747			1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2749			1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2751			1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2753			1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2755			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2757			1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2759			1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2761			1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2763			1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618

2765	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2767	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2769	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2771	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2773	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2775	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2777	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2779	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2781	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2783	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2785	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2787	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2789	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2791	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2793	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2795	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2797	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2799	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	1	0.5	2	2	0.5	0.2618	0.2618
2801	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2803	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2805	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2807	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2809	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2811	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2813	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2815	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2817	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2819	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2821	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2823	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2825	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2827	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2829	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2831	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2833	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2835	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2837	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2839	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2841	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2843	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2845	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2847	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2849	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2851	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2853	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2855	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2857	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2859	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2861	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2863	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2865	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2867	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2869	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2871	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2873	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2875	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2877	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2879	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	4	0.5	2	2	0.5	0.2618	0.2618
2881	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2883	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2885	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2887	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2889	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2891	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2893	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2895	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2897	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2899	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2901	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2903	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2905	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2907	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2909	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2911	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2913	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2915	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2917	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2919	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2921	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2923	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2925	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2927	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2929	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2931	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2933	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2935	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2937	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2939	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2941	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2943	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2945	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2947	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2949	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2951	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2953	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2955	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2957	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2959	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.25	2	2	0.5	0.2618	0.2618
2961	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618

2963	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2965	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2967	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2969	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2971	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2973	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2975	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2977	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2979	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2981	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2983	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2985	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2987	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2989	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2991	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2993	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2995	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2997	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
2999	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3001	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3003	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3005	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3007	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3009	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3011	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3013	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3015	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3017	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3019	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3021	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3023	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3025	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3027	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3029	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3031	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3033	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3035	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3037	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3039	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3041	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3043	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3045	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3047	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3049	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3051	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3053	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3055	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3057	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3059	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3061	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3063	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3065	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3067	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3069	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3071	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3073	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3075	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3077	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3079	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3081	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3083	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3085	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3087	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3089	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3091	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3093	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3095	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3097	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3099	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3101	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3103	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3105	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3107	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3109	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3111	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3113	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3115	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3117	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3119	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	1	2	2	0.5	0.2618	0.2618
3121	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3123	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3125	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3127	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3129	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3131	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3133	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3135	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3137	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3139	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3141	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3143	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3145	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3147	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3149	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3151	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3153	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3155	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3157	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3159	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618

3161	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3163	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3165	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3167	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3169	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3171	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3173	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3175	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3177	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3179	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3181	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3183	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3185	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3187	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3189	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3191	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3193	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3195	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3197	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3199	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	4	2	2	0.5	0.2618	0.2618
3201	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3203	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3205	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3207	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3209	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3211	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3213	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3215	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3217	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3219	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3221	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3223	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3225	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3227	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3229	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3231	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3233	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3235	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3237	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3239	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3241	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3243	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3245	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3247	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3249	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3251	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3253	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3255	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3257	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3259	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3261	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3263	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3265	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3267	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3269	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3271	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3273	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3275	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3277	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3279	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	0.5	2	0.5	0.2618	0.2618
3281	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3283	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3285	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3287	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3289	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3291	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3293	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3295	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3297	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3299	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3301	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3303	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3305	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3307	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3309	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3311	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3313	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3315	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3317	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3319	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3321	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3323	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3325	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3327	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3329	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3331	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3333	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3335	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3337	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3339	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3341	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3343	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3345	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3347	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3349	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3351	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3353	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3355	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3357	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618

3359	[redacted]	[redacted]	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	1	2	0.5	0.2618	0.2618
3361	[redacted]	[redacted]	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3363	[redacted]	[redacted]	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3365	[redacted]	[redacted]	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3367	[redacted]	[redacted]	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3369	[redacted]	[redacted]	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3371	[redacted]	[redacted]	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3373	[redacted]	[redacted]	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3375	[redacted]	[redacted]	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3377	[redacted]	[redacted]	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3379	[redacted]	[redacted]	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3381	[redacted]	[redacted]	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3383	[redacted]	[redacted]	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3385	[redacted]	[redacted]	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3387	[redacted]	[redacted]	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3389	[redacted]	[redacted]	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3391	[redacted]	[redacted]	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3393	[redacted]	[redacted]	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3395	[redacted]	[redacted]	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3397	[redacted]	[redacted]	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3399	[redacted]	[redacted]	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3401	[redacted]	[redacted]	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3403	[redacted]	[redacted]	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3405	[redacted]	[redacted]	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3407	[redacted]	[redacted]	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3409	[redacted]	[redacted]	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3411	[redacted]	[redacted]	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3413	[redacted]	[redacted]	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3415	[redacted]	[redacted]	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3417	[redacted]	[redacted]	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3419	[redacted]	[redacted]	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3421	[redacted]	[redacted]	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3423	[redacted]	[redacted]	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3425	[redacted]	[redacted]	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3427	[redacted]	[redacted]	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3429	[redacted]	[redacted]	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3431	[redacted]	[redacted]	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3433	[redacted]	[redacted]	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3435	[redacted]	[redacted]	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3437	[redacted]	[redacted]	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3439	[redacted]	[redacted]	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3441	[redacted]	[redacted]	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3443	[redacted]	[redacted]	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3445	[redacted]	[redacted]	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3447	[redacted]	[redacted]	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3449	[redacted]	[redacted]	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3451	[redacted]	[redacted]	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3453	[redacted]	[redacted]	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3455	[redacted]	[redacted]	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3457	[redacted]	[redacted]	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3459	[redacted]	[redacted]	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3461	[redacted]	[redacted]	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3463	[redacted]	[redacted]	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3465	[redacted]	[redacted]	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3467	[redacted]	[redacted]	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3469	[redacted]	[redacted]	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3471	[redacted]	[redacted]	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3473	[redacted]	[redacted]	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3475	[redacted]	[redacted]	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3477	[redacted]	[redacted]	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3479	[redacted]	[redacted]	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3481	[redacted]	[redacted]	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3483	[redacted]	[redacted]	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3485	[redacted]	[redacted]	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3487	[redacted]	[redacted]	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3489	[redacted]	[redacted]	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3491	[redacted]	[redacted]	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3493	[redacted]	[redacted]	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3495	[redacted]	[redacted]	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3497	[redacted]	[redacted]	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3499	[redacted]	[redacted]	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3501	[redacted]	[redacted]	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3503	[redacted]	[redacted]	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3505	[redacted]	[redacted]	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3507	[redacted]	[redacted]	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3509	[redacted]	[redacted]	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3511	[redacted]	[redacted]	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3513	[redacted]	[redacted]	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3515	[redacted]	[redacted]	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3517	[redacted]	[redacted]	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3519	[redacted]	[redacted]	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	4	2	0.5	0.2618	0.2618
3521	[redacted]	[redacted]	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3523	[redacted]	[redacted]	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3525	[redacted]	[redacted]	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3527	[redacted]	[redacted]	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3529	[redacted]	[redacted]	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3531	[redacted]	[redacted]	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3533	[redacted]	[redacted]	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3535	[redacted]	[redacted]	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3537	[redacted]	[redacted]	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3539	[redacted]	[redacted]	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3541	[redacted]	[redacted]	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3543	[redacted]	[redacted]	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3545	[redacted]	[redacted]	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3547	[redacted]	[redacted]	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3549	[redacted]	[redacted]	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3551	[redacted]	[redacted]	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3553	[redacted]	[redacted]	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3555	[redacted]	[redacted]	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618

3557	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3559	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3561	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3563	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3565	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3567	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3569	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3571	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3573	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3575	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3577	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3579	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3581	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3583	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3585	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3587	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3589	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3591	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3593	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3595	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3597	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3599	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	0.5	0.5	0.2618	0.2618
3601	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3603	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3605	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3607	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3609	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3611	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3613	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3615	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3617	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3619	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3621	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3623	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3625	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3627	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3629	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3631	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3633	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3635	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3637	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3639	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3641	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3643	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3645	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3647	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3649	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3651	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3653	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3655	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3657	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3659	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3661	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3663	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3665	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3667	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3669	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3671	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3673	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3675	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3677	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3679	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	1	0.5	0.2618	0.2618
3681	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3683	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3685	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3687	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3689	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3691	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3693	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3695	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3697	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3699	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3701	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3703	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3705	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3707	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3709	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3711	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3713	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3715	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3717	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3719	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3721	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3723	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3725	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3727	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3729	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3731	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3733	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3735	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3737	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3739	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3741	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3743	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3745	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3747	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3749	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3751	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3753	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618

3755	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3757	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3759	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3761	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3763	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3765	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3767	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3769	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3771	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3773	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3775	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3777	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3779	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3781	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3783	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3785	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3787	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3789	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3791	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3793	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3795	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3797	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3799	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3801	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3803	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3805	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3807	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3809	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3811	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3813	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3815	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3817	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3819	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3821	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3823	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3825	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3827	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3829	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3831	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3833	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3835	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3837	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3839	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	4	0.5	0.2618	0.2618
3841	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3843	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3845	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3847	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3849	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3851	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3853	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3855	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3857	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3859	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3861	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3863	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3865	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3867	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3869	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3871	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3873	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3875	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3877	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3879	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3881	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3883	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3885	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3887	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3889	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3891	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3893	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3895	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3897	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3899	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3901	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3903	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3905	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3907	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3909	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3911	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3913	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3915	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3917	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3919	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.25	0.2618	0.2618
3921	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3923	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3925	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3927	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3929	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3931	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3933	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3935	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3937	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3939	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3941	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3943	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3945	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3947	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3949	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3951	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618

3953	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3955	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3957	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3959	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3961	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3963	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3965	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3967	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3969	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3971	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3973	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3975	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3977	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3979	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3981	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3983	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3985	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3987	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3989	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3991	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3993	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3995	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3997	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3999	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4001	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4003	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4005	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4007	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4009	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4011	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4013	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4015	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4017	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4019	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4021	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4023	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4025	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4027	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4029	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4031	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4033	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4035	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4037	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4039	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4041	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4043	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4045	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4047	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4049	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4051	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4053	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4055	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4057	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4059	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4061	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4063	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4065	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4067	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4069	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4071	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4073	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4075	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4077	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4079	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	1	0.2618	0.2618
4081	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4083	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4085	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4087	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4089	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4091	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4093	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4095	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4097	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4099	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4101	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4103	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4105	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4107	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4109	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4111	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4113	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4115	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4117	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4119	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4121	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4123	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4125	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4127	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4129	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4131	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4133	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4135	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4137	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4139	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4141	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4143	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4145	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4147	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4149	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618

4151			1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4153			1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4155			1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4157			1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4159			1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	4	0.2618	0.2618
4161			1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4163			1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4165			1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4167			1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4169			1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4171			1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4173			1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4175			1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4177			1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4179			1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4181			1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4183			1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4185			1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4187			1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4189			1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4191			1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4193			1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4195			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4197			1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4199			1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4201			1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4203			1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4205			1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4207			1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4209			1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4211			1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4213			1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4215			1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4217			1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4219			1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4221			1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4223			1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4225			1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4227			1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4229			1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4231			1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4233			1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4235			1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4237			1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4239			1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.1309	0.2618
4241			1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4243			1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4245			1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4247			1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4249			1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4251			1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4253			1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4255			1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4257			1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4259			1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4261			1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4263			1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4265			1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4267			1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4269			1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4271			1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4273			1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4275			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4277			1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4279			1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4281			1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4283			1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4285			1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4287			1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4289			1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4291			1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4293			1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4295			1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4297			1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4299			1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4301			1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4303			1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4305			1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4307			1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4309			1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4311			1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4313			1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4315			1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4317			1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4319			1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4321			1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4323			1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4325			1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4327			1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4329			1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4331			1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4333			1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4335			1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4337			1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4339			1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4341			1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4343			1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4345			1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4347			1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618

4349	[redacted]	[redacted]	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4351	[redacted]	[redacted]	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4353	[redacted]	[redacted]	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4355	[redacted]	[redacted]	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4357	[redacted]	[redacted]	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4359	[redacted]	[redacted]	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4361	[redacted]	[redacted]	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4363	[redacted]	[redacted]	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4365	[redacted]	[redacted]	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4367	[redacted]	[redacted]	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4369	[redacted]	[redacted]	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4371	[redacted]	[redacted]	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4373	[redacted]	[redacted]	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4375	[redacted]	[redacted]	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4377	[redacted]	[redacted]	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4379	[redacted]	[redacted]	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4381	[redacted]	[redacted]	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4383	[redacted]	[redacted]	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4385	[redacted]	[redacted]	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4387	[redacted]	[redacted]	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4389	[redacted]	[redacted]	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4391	[redacted]	[redacted]	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4393	[redacted]	[redacted]	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4395	[redacted]	[redacted]	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4397	[redacted]	[redacted]	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4399	[redacted]	[redacted]	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.3491	0.2618
4401	[redacted]	[redacted]	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4403	[redacted]	[redacted]	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4405	[redacted]	[redacted]	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4407	[redacted]	[redacted]	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4409	[redacted]	[redacted]	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4411	[redacted]	[redacted]	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4413	[redacted]	[redacted]	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4415	[redacted]	[redacted]	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4417	[redacted]	[redacted]	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4419	[redacted]	[redacted]	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4421	[redacted]	[redacted]	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4423	[redacted]	[redacted]	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4425	[redacted]	[redacted]	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4427	[redacted]	[redacted]	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4429	[redacted]	[redacted]	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4431	[redacted]	[redacted]	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4433	[redacted]	[redacted]	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4435	[redacted]	[redacted]	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4437	[redacted]	[redacted]	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4439	[redacted]	[redacted]	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4441	[redacted]	[redacted]	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4443	[redacted]	[redacted]	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4445	[redacted]	[redacted]	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4447	[redacted]	[redacted]	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4449	[redacted]	[redacted]	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4451	[redacted]	[redacted]	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4453	[redacted]	[redacted]	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4455	[redacted]	[redacted]	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4457	[redacted]	[redacted]	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4459	[redacted]	[redacted]	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4461	[redacted]	[redacted]	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4463	[redacted]	[redacted]	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4465	[redacted]	[redacted]	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4467	[redacted]	[redacted]	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4469	[redacted]	[redacted]	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4471	[redacted]	[redacted]	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4473	[redacted]	[redacted]	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4475	[redacted]	[redacted]	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4477	[redacted]	[redacted]	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4479	[redacted]	[redacted]	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.5236	0.2618
4481	[redacted]	[redacted]	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4483	[redacted]	[redacted]	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4485	[redacted]	[redacted]	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4487	[redacted]	[redacted]	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4489	[redacted]	[redacted]	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4491	[redacted]	[redacted]	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4493	[redacted]	[redacted]	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4495	[redacted]	[redacted]	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4497	[redacted]	[redacted]	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4499	[redacted]	[redacted]	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4501	[redacted]	[redacted]	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4503	[redacted]	[redacted]	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4505	[redacted]	[redacted]	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4507	[redacted]	[redacted]	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4509	[redacted]	[redacted]	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4511	[redacted]	[redacted]	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4513	[redacted]	[redacted]	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4515	[redacted]	[redacted]	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4517	[redacted]	[redacted]	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4519	[redacted]	[redacted]	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4521	[redacted]	[redacted]	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4523	[redacted]	[redacted]	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4525	[redacted]	[redacted]	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4527	[redacted]	[redacted]	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4529	[redacted]	[redacted]	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4531	[redacted]	[redacted]	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4533	[redacted]	[redacted]	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4535	[redacted]	[redacted]	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4537	[redacted]	[redacted]	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4539	[redacted]	[redacted]	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4541	[redacted]	[redacted]	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4543	[redacted]	[redacted]	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4545	[redacted]	[redacted]	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309

4547	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4549	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4551	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4553	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4555	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4557	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4559	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.1309
4561	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4563	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4565	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4567	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4569	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4571	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4573	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4575	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4577	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4579	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4581	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4583	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4585	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4587	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4589	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4591	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4593	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4595	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4597	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4599	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4601	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4603	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4605	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4607	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4609	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4611	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4613	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4615	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4617	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4619	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4621	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4623	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4625	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4627	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4629	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4631	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4633	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4635	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4637	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4639	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
4641	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4643	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4645	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4647	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4649	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4651	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4653	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4655	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4657	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4659	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4661	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4663	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4665	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4667	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4669	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4671	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4673	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4675	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4677	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4679	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4681	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4683	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4685	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4687	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4689	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4691	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4693	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4695	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4697	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4699	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4701	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4703	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4705	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4707	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4709	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4711	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4713	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4715	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4717	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4719	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.3491
4721	▨	▨	1	1	0	0	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4723	▨	▨	1	1	0	0	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4725	▨	▨	1	1	0	0	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4727	▨	▨	1	1	0	0	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4729	▨	▨	1	1	0	0	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4731	▨	▨	1	1	0	0	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4733	▨	▨	1	1	0	0	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4735	▨	▨	1	1	0	0	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4737	▨	▨	1	1	0	0	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4739	▨	▨	1	1	0	0	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4741	▨	▨	1	1	0	1	0	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4743	▨	▨	1	1	0	1	0	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236

4745	▨	▨	1	1	0	1	0	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4747	▨	▨	1	1	0	1	0	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4749	▨	▨	1	1	0	1	0	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4751	▨	▨	1	1	0	1	0	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4753	▨	▨	1	1	0	1	0	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4755	▨	▨	1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4757	▨	▨	1	1	0	1	0	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4759	▨	▨	1	1	0	1	0	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4761	▨	▨	1	1	0	1	0	1	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4763	▨	▨	1	1	0	1	0	1	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4765	▨	▨	1	1	0	1	0	1	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4767	▨	▨	1	1	0	1	0	1	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4769	▨	▨	1	1	0	1	0	1	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4771	▨	▨	1	1	0	1	0	1	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4773	▨	▨	1	1	0	1	0	1	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4775	▨	▨	1	1	0	1	0	1	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4777	▨	▨	1	1	0	1	0	1	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4779	▨	▨	1	1	0	1	0	1	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4781	▨	▨	1	1	0	1	1	0	2	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4783	▨	▨	1	1	0	1	1	0	4	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4785	▨	▨	1	1	0	1	1	0	6	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4787	▨	▨	1	1	0	1	1	0	8	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4789	▨	▨	1	1	0	1	1	0	10	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4791	▨	▨	1	1	0	1	1	0	12	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4793	▨	▨	1	1	0	1	1	0	14	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4795	▨	▨	1	1	0	1	1	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4797	▨	▨	1	1	0	1	1	0	18	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236
4799	▨	▨	1	1	0	1	1	0	20	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.5236

COSRO Seeker Parameters														Monopulse Seeker Parameters										
ppc	freqc	antgainc	HPc	noibwc	noifigc	rrc	numpulc	nosangc	envc	nutfreqc	serbwc	crossc	alphac	ppm	freqm	antgainm	HPm	noibwm	noifigm	rrm	numpul	fslrm	crosm	alpham
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	10	11	100	100	24	3000	0.055

APPENDIX N. MISSILE SIMULATIONS II

Simulation #			General Switches							Model Parameters														
			swtsh	nlk	chaff	noise	seltrac	beam	ttg	ska1	ska2	skv1	skv2	enra	enrb	ta1	ta2	tb1	tb2	tm	tmv	tv	sekhlim	sekvlim
1			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
3			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
5			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
7			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
9			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
11			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
13			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
15			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
17			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
19			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
21			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
23			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
25			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
27			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
29			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
31			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
33			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
35			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
37			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
39			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
41			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
43			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
45			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
47			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
49			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
51			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
53			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
55			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
57			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
59			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
61			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
63			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
65			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
67			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
69			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
71			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
73			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
75			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
77			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
79			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
81			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
83			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
85			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
87			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
89			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
91			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
93			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
95			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
97			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618
99			1	1	0	1	0	0	16	0.25	0.25	0.25	0.25	4	4	0.5	0.5	0.5	0.5	2	2	0.5	0.2618	0.2618

COSRO Seeker Parameters														Monopulse Seeker Parameters												
ppc	freqc	antgainc	HPc	noibwc	noifigc	rrc	numpulc	nosangc	envc	nutfreqc	serbwc	crossc	alphac	ppm	freq	antgainm	HPm	noibwm	noifigm	rrm	numpulm	fslrm	crosm	alpham
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	90	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	90	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	90	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	90	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	90	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	90	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	90	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	90	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	90	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	90	9	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	18	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	18	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	18	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	18	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	18	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	18	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	18	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	18	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	18	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	18	33	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	15	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	15	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	15	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	15	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	15	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	15	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	15	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	15	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	15	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	15	4.5	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	9	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	9	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	9	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	9	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	9	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	9	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	9	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	9	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	9	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	9	10	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	5	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	5	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	5	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	5	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	5	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	5	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	5	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	5	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	5	11	100	100	24	3000	0.055
250	9	33	4.5	10	11	100	100	0.5	0.06	60	2	3000	0.0555	30	9	33	4.5	5	11	100	100	24	3000	0.055

APPENDIX O. NEURAL NETWORK IMPLEMENTATION

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%
%% Project: ASCM - Missile/Captive-Carry Simulation
%%
%% Name: Neural Network
%%
%% Type:SCRIPT
%%
%% Purpose: This compiles several codes used in Chapeter
%%          VIII for neural network designing, training,
%%          testing and missile trajectory prediction from
%%          the captive-carry configuration.
%%
%% Date Last Modified: 09/11/98
%%
%% By: LT Wagner A. de Lima Goncalves
%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%

%Training Set # 1

p=[store(1,1).range'store(1,3).range'store(1,5).range'store(
1,7).range'store(1,9).range'...
   store(1,11).range' store(1,13).range'
store(1,15).range'store(1,17).range' store(1,19).range'...
   store(1,21).range' store(1,23).range'
store(1,25).range'store(1,27).range' store(1,29).range';

store(1,1).shpos'store(1,3).shpos'store(1,5).shpos'store(1,7
).shpos'store(1,9).shpos'...

store(1,11).shpos'store(1,13).shpos'store(1,15).shpos'store(
1,17).shpos'store(1,19).shpos'...

store(1,21).shpos'store(1,23).shpos'store(1,25).shpos'store(
1,27).shpos'store(1,29).shpos';
store(1,1).svpos'store(1,3).svpos'store(1,5).svpos'store(1,7
).svpos'store(1,9).svpos'...

store(1,11).svpos'store(1,13).svpos'store(1,15).svpos'store(
1,17).svpos'store(1,19).svpos'...

store(1,21).svpos'store(1,23).svpos'store(1,25).svpos'store(
1,27).svpos'store(1,29).svpos'];


t=[store(1,1).mxpos'store(1,3).mxpos'store(1,5).mxpos'store(
1,7).mxpos'store(1,9).mxpos'...

store(1,11).mxpos'store(1,13).mxpos'store(1,15).mxpos'store(
1,17).mxpos'store(1,19).mxpos'...

store(1,21).mxpos'store(1,23).mxpos'store(1,25).mxpos'store(
1,27).mxpos'store(1,29).mxpos';
   store(1,1).mypos'
store(1,3).mypos'store(1,5).mypos'store(1,7).mypos'store(1,9
).mypos'...

store(1,11).mypos'store(1,13).mypos'store(1,15).mypos'store(
1,17).mypos'store(1,19).mypos'...

store(1,21).mypos'store(1,23).mypos'store(1,25).mypos'store(
1,27).mypos'store(1,29).mypos';

store(1,1).mzpos'store(1,3).mzpos'store(1,5).mzpos'store(1,7
).mzpos'store(1,9).mzpos'...

store(1,11).mzpos'store(1,13).mzpos'store(1,15).mzpos'store(
1,17).mzpos'store(1,19).mzpos'...

store(1,21).mzpos'store(1,23).mzpos'store(1,25).mzpos'store(
1,27).mzpos'store(1,29).mzpos'];

% Neural Network Creation

factorp=max(max(p));
p(1,:)=p(1,:)/factorp;

factort=max(max(t));
t=t/factort;
```

```
net=newff([minmax(p)],[10  3],{'logsig'
'purelin'},'Trainlm');
net.initParam='rands';
init(net);
net.performFcn='mse';
net.trainParam.goal=1e-6;
net.trainParam.show=10;
net.trainParam.epochs=500;

%Neural Network Training
%
net=train(net,p,t);

% Training Set #2
K=30;
p=[store(1,1+K).range'store(1,3+K).range'store(1,5+K).range'
store(1,7+K).range'store(1,9+K).range'...
   store(1,11+K).range' store(1,13+K).range'
store(1,15+K).range'store(1,17+K).range'
store(1,19+K).range'...
   store(1,21+K).range' store(1,23+K).range'
store(1,25+K).range'store(1,27+K).range'
store(1,29+K).range';

store(1,1+K).shpos'store(1,3+K).shpos'store(1,5+K).shpos'sto
re(1,7+K).shpos'store(1,9+K).shpos'...

store(1,11+K).shpos'store(1,13+K).shpos'store(1,15+K).shpos'
store(1,17+K).shpos'store(1,19+K).shpos'...

store(1,21+K).shpos'store(1,23+K).shpos'store(1,25+K).shpos'
store(1,27+K).shpos'store(1,29+K).shpos';

store(1,1+K).svpos'store(1,3+K).svpos'store(1,5+K).svpos'sto
re(1,7+K).svpos'store(1,9+K).svpos'...

store(1,11+K).svpos'store(1,13+K).svpos'store(1,15+K).svpos'
store(1,17+K).svpos'store(1,19+K).svpos'...

store(1,21+K).svpos'store(1,23+K).svpos'store(1,25+K).svpos'
store(1,27+K).svpos'store(1,29+K).svpos'];


t=[store(1,1+K).mxpos'store(1,3+K).mxpos'store(1,5+K).mxpos'
store(1,7+K).mxpos'store(1,9+K).mxpos'...
store(1,11+K).mxpos'store(1,13+K).mxpos'store(1,15+K).mxpos'
store(1,17+K).mxpos'store(1,19+K).mxpos'...

store(1,21+K).mxpos'store(1,23+K).mxpos'store(1,25+K).mxpos'
store(1,27+K).mxpos'store(1,29+K).mxpos';
   store(1,1+K).mypos'
store(1,3+K).mypos'store(1,5+K).mypos'store(1,7+K).mypos'sto
re(1,9+K).mypos'...

store(1,11+K).mypos'store(1,13+K).mypos'store(1,15+K).mypos'
store(1,17+K).mypos'store(1,19+K).mypos'...

store(1,21+K).mypos'store(1,23+K).mypos'store(1,25+K).mypos'
store(1,27+K).mypos'store(1,29+K).mypos';

store(1,1+K).mzpos'store(1,3+K).mzpos'store(1,5+K).mzpos'sto
re(1,7+K).mzpos'store(1,9+K).mzpos'...

store(1,11+K).mzpos'store(1,13+K).mzpos'store(1,15+K).mzpos'
store(1,17+K).mzpos'store(1,19+K).mzpos'...

store(1,21+K).mzpos'store(1,23+K).mzpos'store(1,25+K).mzpos'
store(1,27+K).mzpos'store(1,29+K).mzpos'];

% Neural Network Creation

factorp=max(max(p));
p(1,:)=p(1,:)/factorp;

factort=max(max(t));
t=t/factort;

%Neural Network Training
%
net=train(net,p,t);

% Training Set #3

K=40;

p=[store(1,1+K).range'store(1,3+K).range'store(1,5+K).range'
store(1,7+K).range'store(1,9+K).range'...
   store(1,11+K).range' store(1,13+K).range'
store(1,15+K).range'store(1,17+K).range'
store(1,19+K).range'...
```

```
   store(1,21+K).range' store(1,23+K).range'
store(1,25+K).range'store(1,27+K).range'
store(1,29+K).range';

store(1,1+K).shpos'store(1,3+K).shpos'store(1,5+K).shpos'sto
re(1,7+K).shpos'store(1,9+K).shpos'...

store(1,11+K).shpos'store(1,13+K).shpos'store(1,15+K).shpos'
store(1,17+K).shpos'store(1,19+K).shpos'...

store(1,21+K).shpos'store(1,23+K).shpos'store(1,25+K).shpos'
store(1,27+K).shpos'store(1,29+K).shpos';

store(1,1+K).svpos'store(1,3+K).svpos'store(1,5+K).svpos'sto
re(1,7+K).svpos'store(1,9+K).svpos'...

store(1,11+K).svpos'store(1,13+K).svpos'store(1,15+K).svpos'
store(1,17+K).svpos'store(1,19+K).svpos'...

store(1,21+K).svpos'store(1,23+K).svpos'store(1,25+K).svpos'
store(1,27+K).svpos'store(1,29+K).svpos'];


t=[store(1,1+K).mxpos'store(1,3+K).mxpos'store(1,5+K).mxpos'
store(1,7+K).mxpos'store(1,9+K).mxpos'...

store(1,11+K).mxpos'store(1,13+K).mxpos'store(1,15+K).mxpos'
store(1,17+K).mxpos'store(1,19+K).mxpos'...

store(1,21+K).mxpos'store(1,23+K).mxpos'store(1,25+K).mxpos'
store(1,27+K).mxpos'store(1,29+K).mxpos';
   store(1,1+K).mypos'
store(1,3+K).mypos'store(1,5+K).mypos'store(1,7+K).mypos'sto
re(1,9+K).mypos'...

store(1,11+K).mypos'store(1,13+K).mypos'store(1,15+K).mypos'
store(1,17+K).mypos'store(1,19+K).mypos'...

store(1,21+K).mypos'store(1,23+K).mypos'store(1,25+K).mypos'
store(1,27+K).mypos'store(1,29+K).mypos';

store(1,1+K).mzpos'store(1,3+K).mzpos'store(1,5+K).mzpos'sto
re(1,7+K).mzpos'store(1,9+K).mzpos'...

store(1,11+K).mzpos'store(1,13+K).mzpos'store(1,15+K).mzpos'
store(1,17+K).mzpos'store(1,19+K).mzpos'...
store(1,21+K).mzpos'store(1,23+K).mzpos'store(1,25+K).mzpos'
store(1,27+K).mzpos'store(1,29+K).mzpos'];

% Neural Network Creation

factorp=max(max(p));
p(1,:)=p(1,:)/factorp;

factort=max(max(t));
t=t/factort;

%Neural Network Training
%
net=train(net,p,t);
%============================================================

% Neural Network Graphing (Missile Experiment)


j=input('Enter the j value. "j" ranges from 1 to 8 --->  ');
k= (j-1)*10;
ind=5+k;
p=[store(1,ind).range';
store(1,ind).shpos';
store(1,ind).svpos'];

factorp=max(max(p));
p(1,:)=p(1,:)/factorp;

a=sim(net,p);

figure(1)
subplot(3,1,1)
plot3(store(1,ind).mxpos,store(1,ind).mypos,store(1,ind).mzp
os,'r-.',...
      a(1,:)*factorp,a(2,:)*factorp,a(3,:)*factorp,'b-')
view(28,26)
orient tall
grid
xlabel('down range')
ylabel('cross range')
zlabel('altitude')
legend('missile','prediction')
title([' Missile Trajectory Comparison - Actual x NN
Prediction Simulation 'num2str(ind)])
```

```
subplot(3,2,3)
plot(store(1,ind).mxpos,store(1,ind).mypos,'r-.',...
      a(1,:)*factorp,a(2,:)*factorp,'b-')
grid
xlabel('down range')
ylabel('cross range')
%legend('missile','prediction')

subplot(3,2,4)

plot(store(1,ind).mxpos,store(1,ind).mzpos,'r-.',...
      a(1,:)*factorp,a(3,:)*factorp,'b-')
grid
xlabel('down range')
ylabel('altitude')
%legend('missile','prediction')

subplot(3,1,3)

xx1=store(1,ind).mxpos';
xx2=a(1,:)*factorp;
yy1=store(1,ind).mypos';
yy2=a(2,:)*factorp;
zz1=store(1,ind).mzpos';
zz2=a(3,:)*factorp;

ms_error=sqrt((xx1-xx2).^2+(yy1-yy2).^2+(zz1-zz2).^2);

plot(store(1,ind).time,ms_error)
xlabel('simulation Time (sec)')
ylabel('Mean Square Error (ft)')
grid

figure(2)

subplot(3,1,1)
plot(store(1,ind).time,store(1,ind).shpos)
xlabel('Time(sec)')
ylabel('Seeker Hor. Position(deg)')
title([' Neural Network Inputs - Simulation 'num2str(ind)])
grid

subplot(3,1,2)
plot(store(1,ind).time,store(1,ind).svpos)
xlabel('Time(sec)')
ylabel('Seeker Vert. Position(deg)')
grid
```

```
subplot(3,1,3)
plot(store(1,ind).time,store(1,ind).range)
xlabel('Time(sec)')
ylabel('Range (ft)')
grid
%==========================================================

% Neural Network Missilie Dynamics from the Captive_Carry
Experiment

 j=input('Enter the j value. "j" ranges from 1 to 8 --->
');
 k= (j-1)*10;
 ind=8+k;
 ind1=ind-1;


pp=[store(1,ind).range';store(1,ind).shpos';store(1,ind).svp
os'];

 len=round(0.97822*length(store(1,ind).mxpos));
 p=[pp(:,1:1:len)];

 factorp=max(max(p));
 p(1,:)=p(1,:)/factorp;

 a=sim(net,p);

figure(1)
subplot(2,1,1)
plot3(store(1,ind).mxpos,store(1,ind).mypos,store(1,ind).mzp
os,'g.',...
       a(1,:)*factorp,a(2,:)*factorp,a(3,:)*factorp,'r+',...
       store(1,ind-1).mxpos,store(1,ind-
1).mypos,store(1,ind-1).mzpos,'b-.',...
       store(1,ind-1).txpos,store(1,ind-
1).typos,store(1,ind-1).tzpos,'mo')
view(38,52)
orient tall
grid
xlabel('down range')
ylabel('cross range')
zlabel('altitude')
title([' Missile/Captive-Carry/Prediction Comparison -
Simulation 'num2str(ind)])
```

```
legend('Captive-Carry','Missile Dynamics Prediction','Actual
Missile')


subplot(2,2,3)
plot(store(1,ind).mxpos,store(1,ind).mypos,'g.',...
   a(1,:)*factorp,a(2,:)*factorp,'r+',...
   store(1,ind-1).mxpos,store(1,ind-1).mypos,'b-.',...
   store(1,ind-1).txpos,store(1,ind-1).typos,'mo')
orient tall
grid
xlabel('down range')
ylabel('cross range')

subplot(2,2,4)
plot(store(1,ind).mxpos,store(1,ind).mzpos,'g.',...
    a(1,:)*factorp,a(2,:)*factorp,'r+',...
    store(1,ind-1).mxpos,store(1,ind-1).mzpos,'b-.',...
    store(1,ind-1).txpos,store(1,ind-1).tzpos,'mo')
orient tall
grid
xlabel('down range')
ylabel('altitude')

figure(2)

subplot(3,1,1)
plot(store(1,ind).time,store(1,ind).shpos)
xlabel('Time(sec)')
ylabel('Seeker Hor. Position(deg)')
title([' Neural Network Inputs - Simulation 'num2str(ind)])
grid

subplot(3,1,2)
plot(store(1,ind).time,store(1,ind).svpos)
xlabel('Time(sec)')
ylabel('Seeker Vert. Position(deg)')
grid

subplot(3,1,3)
plot(store(1,ind).time,store(1,ind).range)
xlabel('Time(sec)')
ylabel('Range (ft)')
grid

real_miss_distance= store(1,ind-1).miss
```

```
xx1=(store(1,ind1).txpos);
xx2=(a(1,len)*factorp);
yy1=(store(1,ind1).typos);
yy2=(a(2,len)*factorp);
zz1=(store(1,ind1).tzpos);
zz2=(a(3,len)*factorp);
predicted_miss_distance=min(sqrt((xx1-xx2).^2+(yy1-
yy2).^2+(zz1-zz2).^2))-1000

figure(3)

plot3(a(1,:)*factorp,a(2,:)*factorp,a(3,:)*factorp,store(1,i
nd1).txpos,...
      store(1,ind1).typos,store(1,ind1).tzpos)
view(25,65)
grid
xlabel('x')
ylabel('y')
zlabel('z')
```

LIST OF REFERENCES

1. Zarchan, P., *Tactical and Strategic Missile Guidance*, vol. 157, p. 26, American Institute of Aeronautics and Astronautics, Inc., 1994.

2. *Electronic Warfare and Radar Systems Engineering Handbook*, p. 10-1.2, Naval Air Systems Command and Naval Air Warfare Center Weapons Division, 1997.

3. *Electronic Warfare and Radar Systems Engineering Handbook*, p. 10-1.34, Naval Air Systems Command and Naval Air Warfare Center Weapons Division, 1997.

4. Rowe, A. W., *High Accuracy Distributed Sensor Time-Space-Position Information System for Captive-Carry Field Experiments*, p.31, Naval Postgraduate School, 1996.

5. *Electronic Warfare and Radar Systems Enginnering Handbook*, p. 10-1.36, Naval Air Systems Command and Naval Air Warfare Center Weapons Division, 1997.

6. Barton, D. K., *Modern Radar System Analysis*, pp. 387-393, ARTECH HOUSE, Inc., 1988.

7. Brochure about Active Expendable Decoy System from AWA Defence Industries Pty Ltd.

8. Gill, C. W. and Pace, P. E., *Neural Prediction of Missile Dynamics During Hardware-In-The –Loop Captive-Carry Experiments*, Proceedings of the IEEE International Conference on Neural Networks, Houston, TX, 1997, pp. 2208- 2213.

9. Demuth, H. and Beale, M., *Neural Network Toolbox for Use with Matlab*, pp. 1-2, The MathWorks, Inc, 1998.

10. Hagan, M. T., Demuth, H. B., and Beale, M., *Neural Network Design*, Plus Publishing Co, MA, 1998.

11. Demuth, H., and Beale, M., *Neural Network Toolbox for Use with Matlab*, The MathWorks, Inc, 1998.

12. Hagan, M. T., Demuth, H. B., and Beale, M., *Neural Network Design*, pp. 12.19-12.23, Plus Publishing Co, MA, 1998.

13. Demuth, H. and Beale, M., *Neural Network Toolbox for Use with Matlab*, in Back Propagation, pp. 5-31, The MathWorks, Inc, 1998.

14. Gill, C. W., and Pace, P. E., *Neural Prediction of Missile Dynamics During Hardware-In-The –Loop Captive-Carry Experiments*, Proceedings of the IEEE International Conference on Neural Networks, Houston, TX, 1997, pp. 2209-2210.

INITIAL DISTRIBUTION LIST

1.	Defense Technical Information Center 8725 John J. Kingman Rd., STE 0944 Ft. Belvoir, VA 22060-6218	2
2.	Dudley Knox Library Naval Postgraduate School 411 Dyer Rd. Monterey, CA 93943-5000	2
3.	Superintendent Attn: Professor Phillip E. Pace/Code EC/Pc Naval Postgraduate School 411 Dyer Rd. Monterey, CA 93943-5000	1
4.	Superintendent Attn: Professor Robert G. Hutchins/Code EC Naval Postgraduate School 411 Dyer Rd. Monterey, CA 93943-5000	1
5.	Superintendent Attn: Chairman, Electronic Warfare Academic Group/ Code IW Naval Postgraduate School Monterey, CA 93943-5000	1
6.	Commanding Officer Attn: Mr. Brian O'Connor/Code 5761.00 Naval Research Laboratory 4555, Overlook Avenue S.W. Washington D.C. 20375-5339	1
7.	Commanding Officer Attn: Mr. Don W. Kahl/Code 5762.00 Naval Research Laboratory 4555, Overlook Avenue S.W. Washington D.C. 20375-5339	1

8. Commanding Officer 1
Attn: Mr. Brian Edwards/Code 5760.00
Naval Research Laboratory
4555, Overlook Avenue S.W.
Washington D.C. 20375-5339

9. Commander.. 1
Attn: Mr. L. Peterson/Code PMA 272E1B
Naval Air Systems Command
Jacksonville, FL 32212-0122

10. Commander.. 1
Attn: Mr. Steve Wireman/Weapons Division Code/53C000D
Naval Air Warfare Center
China Lake, CA 939555

11. Commanding Officer 1
Attn: Mr. Anthony Link/Code 5765.00
Naval Research Laboratory
4555, Overlook Avenue S.W.
Washington D.C. 20375-5339

12. Commanding Officer 1
Attn: Mr. Bryan McGee/Code 5761.00
Naval Research Laboratory
4555, Overlook Avenue S.W.
Washington D.C. 20375-5339

13. LT Wagner A. de Lima Goncalves 1
589 E. Sampson Lane
Monterey, CA, 93940

REPRODUCTION QUALITY NOTICE

This document is the best quality available. The copy furnished to DTIC contained pages that may have the following quality problems:

- Pages smaller or larger than normal.
- Pages with background color or light colored printing.
- Pages with small type or poor printing; and or
- Pages with continuous tone material or color photographs.

Due to various output media available these conditions may or may not cause poor legibility in the microfiche or hardcopy output you receive.

☑ If this block is checked, the copy furnished to DTIC contained pages with color printing, that when reproduced in Black and White, may change detail of the original copy.